U.S. DEPARTMENT OF COMMERCE
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PB-262 923

Air Pollution Abstracts 54661-55602. Volume 7 Number 3. March 1976

Environmental Protection Agency, Research Triangle Park, N C

Mar 76

PB 262 923

Volume 7, No. 3
March 1976
CODEN:APABCA 7(3)1976
ISSN:0027-6956

AIR POLLUTION ABSTRACTS

54661-55602

MARCH 1976

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Air Quality Planning and Standards
Research Triangle Park, N. C. 27711

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TECHNICAL REPORT DATA

(Please read Instructions on the reverse before completing)

1. REPORT NO. APABCA-7-3-1976	2.	3. RECIPIENT'S ACCESSION NO.
4. TITLE AND SUBTITLE Air Pollution Abstracts Volume 7, No. 3		5. REPORT DATE March 1976
		6. PERFORMING ORGANIZATION CODE
7. AUTHOR(S)		8. PERFORMING ORGANIZATION REPORT NO.
9. PERFORMING ORGANIZATION NAME AND ADDRESS Air Pollution Technical Information Center Research Triangle Park, North Carolina 27711		10. PROGRAM ELEMENT NO.
		11. CONTRACT/GRANT NO.
12. SPONSORING AGENCY NAME AND ADDRESS Same		13. TYPE OF REPORT AND PERIOD COVERED
		14. SPONSORING AGENCY CODE

15. SUPPLEMENTARY NOTES

16. ABSTRACT

This periodical is published to inform air pollution personnel of the Environmental Protection Agency (EPA), and others, of technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Translations are cited with their sources whenever possible. The subject fields are as follow: Emission Sources; Control Methods; Measurement Methods; Air Quality Measurements; Atmospheric Interactions; Basic Science and Technology; Effects-Human Health; Effects-Plants and Livestock; Effects-Materials; Economic Aspects; Standards and Criteria; Legal and Administrative; Social Aspects; and General and Miscellaneous. All abstracts are listed under one of the above subject fields. A subject and author index are included. This issue contains abstracts 54661 - 55602.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS	b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group
Air pollution Abstracts Information retrieval		13B 5B

18. DISTRIBUTION STATEMENT Unlimited	19. SECURITY CLASS *(This Report)*	21. NO. OF PAGES 202
	20. SECURITY CLASS *(This page)*	22. PRICE 7.75

EPA Form 2220-1 (9-73)

AIR POLLUTION ABSTRACTS

VOLUME 7, NO. 3 MARCH 1976

Prepared by
Air Pollution Technical Information Center (APTIC)
Research Triangle Park, North Carolina 27711

Subscribers receiving 'Air Pollution Abstracts'
directly from the U. S. Government Printing Office
should address any inquiries regarding issues
subsequent to June 1972 to:

U. S. Government Printing Office, Washington, D., C. 20402

The Administrator of the Environmental Protection Agency has determined that the publication of this periodical is necessary in the transaction of public business required by law of this Agency. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through March 31, 1975.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

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Author Index AI-1

Personal authors are arranged alphabetically. The names are presented last name first. When the author is a primary author, an asterisk precedes the Abstract Number.

INTRODUCTION

This periodical is intended to inform personnel of the Environmental Protection Agency (EPA), and others who are also professionally interested in air pollution, of selected technical literature recently accessioned by the Air Pollution Technical Information Center (APTIC). For each accession, its Abstract Number, APTIC accession number, bibliographic citation, and abstract are given. Semiannual cumulative indexes to both subject and author are also sent to all recipients of this monthly publication.

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Acknowledgement is given to the Technical Publications Branch, Informational Services Division, Office of Administration, Research Triangle Park, N.C. for the make-up of the cover and for arrangement of printing and distribution.

Feedback from our users, including suggestions of articles, are always welcome.

APTIC Publications

Air Pollution Aspects of Emission Sources: Primary Lead Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:126, $0.65.

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Air Pollution Aspects of Emission Sources: Pulp and Paper Industry - A Bibliography with Abstracts, March 1973, GPO No. EP 4.9:121, $2.35.

Air Pollution Aspects of Emission Sources: Primary Aluminum Production - A Bibliography with Abstracts, June 1973, GPO No. EP 4.9:119, $0.90.

Mercury and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:114, $1.25.

Odors and Air Pollution: A Bibliography with Abstracts, October 1972, GPO No. EP 4.9:113, $3.00.

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Hydrochloric Acid and Air Pollution: An Annotated Bibliography, July 1971, GPO No. EP 4.9:100, $0.55.

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Air Pollution Aspects of Emission Sources: Cement Manufacturing - A Bibliography With Abstracts, May 1971, GPO No. EP 4.9:95, $0.50.

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Photochemical Oxidants and Air Pollution: An Annotated Bibliography (2 Volumes), March 1971, GPO No. EP 4.9:88, $6.25.

Beryllium and Air Pollution: An Annotated Bibliography, February 1971, GPO No. EP 4.9:83, $0.40.

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DEMONSTRATION OF RELATIONSHIP BETWEEN AMBIENT OXIDANT LEVELS AND NON-METHANE HYDROCARBONS OR NON-METHANE HYDROCARBON EMISSIONS.
Pacific Environmental Services, 1930 14th Street, Santa Monica, California 90404

Contract No. 68-02-2282, RFP No. Du-76-B041 .... *$26,180*
LABORATORY RESEARCH ANIMALS.
Microbiological Associates, 4733 Bethesda Avenue, Bethesda, Maryland 20014

Contract No. 68-02-1377, Task Order No. 13 .... *$200,000*
REVISE AND APPLY THE SINGLE SOURCE MODELING PROCEDURE.
Walden Research Division of Abcor, 201 Vassar Street, Cambridge, Massachusetts 02139

SUBJECT FIELDS AND SCOPE NOTES

1. EMISSION SOURCES

Information pertaining to an industry, process, or material associated with air pollution. Documents in this category are concerned primarily with characteristics of a specific class of emission sources including types, rates, industries; secondary coverage may include effects, control methods, etc.

2. CONTROL METHODS

Includes equipment and both specific source control and general abatement efforts. Included are documents describing the operating principles, design, operation, efficiency, etc., of equipment and methods of removing pollutants. The scope of the document can vary from a device for a specific source to an approach applicable to an entire industry--e.g., automobiles.

3. MEASUREMENT METHODS

Includes equipment as well as methods. Confined to development testing and evaluation of pollutant determination methods (sampling, analytical, monitoring) and equipment, as such. Data obtained by use of methods in specific applications are placed in the applicable subject categories.

4. AIR QUALITY MEASUREMENTS

Pollution measurements in the ambient air, generally related to specific geographical locations, such as area surveys. Also includes general reviews of area situations and emission source inventories.

5. ATMOSPHERIC INTERACTION

All chemical and physical phenomena occurring in the atmosphere Included is material on dispersion, air pollution forecasts, meteorological effects, topographical effects, photochemical reactions in the atmosphere, etc. Laboratory studies of photochemical reactions are assigned to Basic Science and Technology.

6. BASIC SCIENCE AND TECHNOLOGY

General discussions or data compilations for the basic physical and chemical properties of pollutants. Theoretical and laboratory studies on related chemical and biological reactions and mechanisms. Mass transfer and other basic knowledge related to process engineering applications in emission control or abatement. Excludes photochemical studies in the atmosphere and biochemical studies related to effects of air pollution.

7. EFFECTS--HUMAN HEALTH

Covers medical and epidemiological studies; biological effects other than those on plants and livestock produced by air pollutants; laboratory animal experiments.

8. EFFECTS--PLANTS AND LIVESTOCK

Effects on vegetation--crops, trees, other plants--and on livestock as distinguished from laboratory experimental animals.

9. EFFECTS--MATERIALS

Deterioration, corrosion, etc., of physical materials, buildings, and structures.

10. ECONOMIC ASPECTS

Economic implications of air pollution and its control, e.g., economic losses from pollution damage, and costs of control programs or equipment in general.

11. STANDARDS AND CRITERIA

Recommended or adopted guides, criteria and standards for allowable emission limits or pollutant concentrations, air quality, equipment characteristics, and fuels.

12. LEGAL AND ADMINISTRATIVE

Legal aspects include legislation, ordinances, rules, litigation, hearings, decisions, etc. Administration covers administrative and miscellaneous information concerning control agencies and control and research programs. Typical topics are personnel, budgets, contractual activities and program descriptions.

13. SOCIAL ASPECTS

Sociological and psychological aspects such as social attitudes public opinion studies, public relations, and public information.

14. GENERAL AND MISCELLANEOUS

Reviews of general problems, trends and background. Documents not assignable to other categories.

ABSTRACT BULLETIN

EMISSION SOURCES

1975

54661 **APTIC NO. 77289**

Alwang, W. G., N. T. Campbell, and R. H. Groth

EMPIRICAL VALIDATION OF TURBINE ENGINE EXHAUST MEASUREMENTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 2 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-03.3.)*

Relationships for empirically validating turbine engine exhaust measurements are discussed. A plot of the volume percent of carbon dioxide versus the volume percent of oxygen, both properly corrected to complete combustion, is a straight line, and the intercept on the Y-axis (zero oxygen) is a function of the hydrogen to carbon mole ratio in the fuel. All points corresponding to CO2 and O2 analyses fall on the straight line for all valid measurements. Additional smooth functional relationships exist between other exhaust gas constituents as well, although the form is not a simply derivable linear relationship like that for O2-CO2. The following additional correlations are useful: CO2 versus the log of nitrogen oxides, the log of carbon monoxide versus the log of total hydrocarbons, the log of CO versus CO2, and the log of total hydrocarbons versus CO2. These relationships serve to indicate the probability of reliable data and point out sampling and instrumental problems. Subtle changes in engine operation can also be detected. The use of a combination of these curves can serve to indicate which measurement is in error. (Author abstract modified)

54662 **APTIC NO. 79451**

Apostolescu, N.

A MODEL TO PREDICT THE NITRIC OXIDE FORMATION IN THE DIRECT INJECTION DIESEL ENGINE. *Rev. Roumaine Sci. Tech. Ser. Electrotech. Energet., 20(1):115-123, 1975. 3 refs.*

A model for predicting nitric oxide exhaust emissions from direct injection diesel engines is presented. The concentration and temperature field during engine combustion are modeled by assuming the cylinder charge to consist of finite packages of fresh air and burned gases of uniform pressure. A thermodynamic model of combustion is then combined with a kinetic model to yield the NO production time-history. In every package of burned gases, NO is formed and accumulated gradually during the combustion and expansion strokes until the temperature reduction freezes the chemical reactions. Experimental measurements of NO production from a direct injection diesel engine give fair agreement with the model s predictions of NO formation. (Author abstract modified)

54663 **APTIC NO. 79517**

Autruffe, Hubert

RAILROAD AND THE ENVIRONMENT. *(Le transport ferroviaire et les problemes d environnement). Text in French. Rev. Gen. Chemins de Fer, vol. 94:300-306, May 1975. (Presented at the Association of Environmental Sciences and Techniques Conference, Paris, France, Jan. 1975.)*

Environmental aspects of railroad transportation in France are discussed. Sixty-five percent of the entire railroad network is serviced by electric trains, whose combined electricity consumption amounts to 2.65% of the total production. Thus, the air pollution generated by electric traction indirectly at power plants is negligible. Apart from electric traction, diesel traction is most important, and there are 27 gas turbine-powered traction units. The number of steam engines is negligible, and is dwindling further. The carbon monoxide and nitrogen oxides emissions from these non-electric traction units are negligible when compared to the quantities that would be emitted by passenger cars carrying the same number of passengers over the same distance.

54664 **APTIC NO. 79069**

Brock, Thomas D.

ENVIRONMENTAL IMPACT OF ENERGY GENERATION: THE SULFUR CYCLE. *In: Mineral Resources and the Environment. Appexdix to Section III Report of Panel on the Implications of Mineral Production for health and the Environment. National Academy of Sciences, Washington, D. C., Committee on Mineral Resources and the Environment, Department of the Interior and National Science Foundation Contract S0122128, D73.123C, C310-285-000, P. A.1-A.45, Feb. 1975. 40 refs.*

NTIS: PB 239582

The environmental impact of sulfur pollution resulting from the combustion of fossil fuels is discussed within the context of the sulfur cycle. Topics covered include: the geochemistry of sulfur; sources and sinks of atmospheric sulfur compounds, residence times of sulfur compounds, the toxic effect of sulfur dioxide on plants, sulfur dioxide corrosion, and acid mine drainage. Coal combustion is estimated to account for 70% of the total sulfur dioxide emission on earth. The average concentrations of sulfur dioxide, hydrogen sulfide, and sulfates in the lower atmosphere are estimated to be 0.2 ppb, 0.2 ppb, and 2 micrograms/cu m, respectively. Sulfur pollution is concluded to be significant and perhaps critical in terms of its impact on natural and human ecosystems. The implementation of stack gas desulfurization methods is recommended along with the establishment of a national network for monitoring acid rain.

54665 **APTIC NO. 79493**

Dartnell, Peter L.

LEAD AND ENERGY. *Petrol. Rev., 29(339):168-173, March 1975. 10 refs.*

Gasoline octane is related to detonation, which occurs when the last part of the charge in the cylinder ignites spontaneously ahead of the flame front. Increasing octane increases resistance to detonation, enabling use of higher compression ratios, consequently improving thermal efficiency and fuel consumption. Steady state fuel consumption measurements made with a passenger car engine at various compression ratios demonstrate the possible fuel savings with compression ratio and octane quality at current levels. The estimated fuel consumption penalty in the U. S. from use of unleaded gasoline is shown. It is virtually impossible to produce high octane gasoline commercially without the addition of lead. It is possible to operate at higher compression ratio at high load, constant speed conditions, with leaded gasoline compared with fuel of the same octane with reduced lead. Raising the U. S. unleaded octane pool from 88 Research Octane Number

(RON) to 96 RON will boost crude oil requirements by 20%. Economics of lead reduction are discussed. Lead provides a significant contribution to extending the energy in crude oil. Alternative refinery processing techniques, involving considerable capital investment and operating costs, can replace some of the octane numbers which would be lost through minimizing the use of lead. Lead emissions to the atmosphere could be reduced by an exhaust gas filter system. Extensive experience and testing have shown such systems to be durable, effective, and cheap to manufacture. Lead emissions during town type driving would be reduced by at least 90%.

54666 **APTIC NO. 79505**

De Souza, T. L. C., D. C. Lane, and S. P. Bhatia

ANALYSING SULPHUR COMPOUNDS IN KRAFT FURNACE STACK GASES. *Pulp Paper Can., 76(6):73-76, June 1975. 16 refs.*

Laboratory and field tests involving the sampling and analysis of total reduced sulfur compounds in Kraft furnace stack gases are described. A coulometric titrator is capable of continuously monitoring total sulfur without filters or individual compounds like hydrogen sulfide, sulfur dioxide, methyl mercaptan, methyl sulfide, and dimethyl disulfide with appropriate filters. However, the titrator is susceptible to operational problems involving sudden gas pressure surges. It is also difficult to use a single total reduced sulfur compound conversion factor for the monitoring of a source of variable gas composition. A gas chromatograph equipped with a flame photometric detector is capable of separating each individual sulfur compound in the Kraft furnace stack gas. However, the chromatograph provides only intermittent analysis, although it appears possible to adapt it for continuous (cyclic) operation. The use of an acetone-washed Porapak QS column in the separation of sulfur compounds represents a significant improvement over other packings. Teflon is the material of choice for sampling lines at Kraft mill installations.

54667 **APTIC NO. 79009**

Elfers, Lawrence and Harold Richter

MONITORING VINYL CHLORIDE IN THE VICINITY OF POLYVINYL CHLORIDE FABRICATION PLANTS. *Preprint, PEDCO-Environmental Specialists, Inc., Cincinnati, Ohio and Environmental Protection Agency, Raleigh, N. C., National Environmental Research Center, 5p., 1975. (Presented at the Environmental Sensing and Assessment International Conference, Las Vegas, Nev., Sept. 14-19, 1975.)*

Ambient vinyl chloride levels were monitored in the vicinity of six plastics manufacturing plants. Polyvinyl chloride was used in the manufacturing processes at five of the plants; the sixth plant was investigated as a control study. Vinyl chloride concentrations at two of the PVC fabrication plants and at the control plant were below the detection limit of 0.5 ppb. Concentrations at the other three plants generally ranged from 0.5-5 ppb and were considered to be relatively low. The highest concentration measured was 7 ppb. Current knowledge of the health-related effects associated with vinyl chloride exposure indicates that the PVC plants are not a significant source of hazardous emissions at the concentrations measured during the study. (Author summary modified)

54668 **APTIC NO. 77290**

Elwood, J. H., D. J. Robertson, D. G. Gardner, and R. H. Groth

PROBLEMS IN ESTABLISHMENT OF STANDARD REFERENCE GASES AND ANALYTICAL PROCEDURES FOR USE IN GAS TURBINE EXHAUST MEASUREMENTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1975. 16 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 74-03.4.)*

Problems relating to the establishment of standard reference gases and analytical procedures for use in gas turbine exhaust measurements are discussed. Although a number of standard reference gases developed by the National Bureau of Standards for use in the automobile industry are also suitable for gas turbine exhaust measurements, there is a need for additional standards such as nitric oxide in nitrogen, intermediate levels of carbon dioxide in air, and higher concentrations of carbon monoxide in nitrogen and propane in air. Certain reference materials are difficult to maintain because of their instability in cylinders. Instrumental operational problems with flame ionization detector type units also exist, particularly with regard to differences in response per carbon atom in different organic molecules and differences in response of a test sample as a function of the oxygen content of the sample. Instrumental problems such as converter efficiency in chemiluminescence units for measuring nitrogen dioxide and calibration techniques involving CO to methane conversion are another concern. Problems also occur in the use of wet chemical methods for the determination of nitrogen oxides. (Author abstract modified)

54669 **APTIC NO. 79001**

English, J. Morley and Gerard L. Kernan

THE ESTIMATION AND CONTROL OF STRATOSPHERIC EMISSIONS FROM AIRCRAFT IN THE 1990-2000 DECADE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1975. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-22.7.)*

Results from the Climatic Impact Assessment Program regarding the estimation and control of stratospheric emissions from supersonic aircraft in the 1990-2000 decade are presented. The nitrogen oxides from an upper bound fleet, if not controlled, are capable of doubling the natural concentration of NOx in the stratosphere by the year 2000, with as much as a 10% reduction in ozone being possible. Although considerable uncertainty is associated with estimating the effect of sulfur aerosols on global mean temperature, a 0.07 C decrease in global mean temperature is possible. The total estimated upper bound global emissions of NOx, CO, total hydrocarbons, soot, and sulfur dioxide are: 16,708, 4236, 706, 29, and 1410 tons/day by the year 2000. (Author conclusions modified)

54670 **APTIC NO. 79388**

Fokina, V. D.

AIR POLLUTION IN WEST GERMANY AND POLLUTION CONTROL MEASURES. *(Zagryaznenie vozdushnoy sredy FRG i mery bor by s nim). Text in Russian. Gigiena i Sanit., no. 5:73-75, 1975. 5 refs.*

Current problems and efforts made in West Germany in the area of clean air maintenance are surveyed. Air pollution has reached alarmingly high levels in certain industrial areas, such as the Ruhr district, the Rhine-Main area, Saarland, and Hamburg. The leading air pollutants are dust, lead, and polycyclic aromatic hydrocarbons, such as benzo(a)pyrene. Considerable reduction of the solar radiation intensity due to dust has been noted. A sharp increase has been experienced in morbidity due to respiratory tract diseases. A national air quality monitoring network has been set up for the continuous measurement of the concentrations of sulfur dioxide, carbon monoxide, nitrogen oxides, hydrocarbons, and dust. Maximum allowable concentrations have been promulgated for nitric oxide, nitric acid, hydrocarbons, hydrogen sulfide, sulfur dioxide, and other air pollutants in workplace air and in the atmosphere.

54671 **APTIC NO. 79511**

Fraszczak, Krystyna and Krzysztof Wojcik

FLUORINE COMPOUNDS IN A SULFUR-PRODUCING INDUSTRIAL REGION. *(Zwiazki fluoru w powietrzu atmosferycznym w rejonie zaglebia siarkowego). Text in Polish. Ochrona Powietrza (Warsaw), no. 3:91-92, 1975.*

Volatile fluorine compounds have a toxic effect on live organisms and constitute a serious problem in sulfur-producing regions because they frequently exceed permissible concentrations. They are emitted by plants manufacturing powderized and granular superphosphates. These fluorine gases are hydrogen fluoride (HF) and silicon tetrafluoride (SiF_4), which cause a serious irritation of the upper respiratory tract. Chronic intoxication at low concentrations is probably due to the highly toxic fluorine ion (F^-). Fluorine and its compounds emitted with industrial waste gases can lead to fogs resulting in mass poisoning in an industrial area during adverse atmospheric conditions. Systematic investigations of atmospheric volatile fluorine compounds are therefore necessary. A method is described by which, based on collected annual data, the frequency of excessive permissible 20-min and average daily concentrations over an area of 280 sq km was statistically calculated. The former, higher than permissible concentration (0.03 mg/F/cu m) should not occur more than once a day, the latter (standard 0.01 mg F/cu m) concentration once every 10 days over a period of one year, which corresponds to 1.4% and 10%, respectively. Determination of the fluorine ion content was performed colorimetrically with alizarin and lanten nitrate. The intensity of the color change in the solution from red to blue is proportionate to the fluorine concentration. The status of air pollution with fluorine compounds for 1972 and 1973 was established and the role of wind direction in the spread of pollution was taken into consideration for the hours of the sample taking. Evaluation of the environmental danger level led to a successful program of limiting fluorine compound emissions.

54672 **APTIC NO. 77248**

Hattori, Yutaka

AIR POLLUTION. *(Taiki osen). Text in Japanese. Hikaku Gijutsu (Leather Technol.), 17(1):110, May 1975.*

The necessity of air pollution control in the leather processing industry is considered. Since the odor control law was established in 1971 and organic solvents beecame known as the factors responsible for photochemical reactions, the leather industry has been asked to institute air pollution control. The odorous compounds discharged from leather processing factories include ammonia, methyl mercaptan, hydrogen sulfide, methyl sulfide, and trimethyl amine. Ammonia levels within the factories are generally very high, while the levels of the other compounds are not. There has been little technical research done for odor control in the leather industry. Organic solvent mist control is also necessary because the leather industry is one of the industries which were designated as an atmospheric dust generating facility. Because of the lack of previous research on air pollution control for the leather industry, cooperation with the paint industry is necessary.

54673 **APTIC NO. 77123**

Hoshika, Yasuyuki, Satoshi Kadowaki, Ichiro Kojima, Kazumi Koike, and Kenji Yoshimoto

THE GAS CHROMATOGRAPHIC ANALYSIS OF SULFUR COMPOUNDS AND ALIPHATIC AMINES IN THE EXHAUST GAS FROM A FISHMEAL DRYER AND COOKER. *(Gasu kuromato gurafi ni yoru sakana kako kojo kara haishutsu sareru ioukagobutsu oyobi shibozoku aminrui no bunseki). Text in Japanese. Yukagaku (J. Japan Oil Chem. Soc.), 24(4):27, April 1975.*

Gas chromatographic analyses of sulfur compounds and aliphatic amines in the exhaust gas from a fishmeal dryer and cooker were made using two different sampling techniques: direct cold trap method with liquid oxygen and chemical trap method with 0.1 N hydrochloric acid solution. Eleven sulfur compounds and 7 sulfur compounds were identified in the exhaust gases from the fishmeal dryer and cooker, respectively, with the direct cold trap method. The major sulfur compounds and their determined concentrations were 0.08 ppm carbonyl sulfide, 0.91 ppm hydrogen sulfide, 0.03 ppm carbon disulfide, 0.32 ppm methyl mercaptan, 0.40 ppm n-propyl mercaptan, and 0.17 ppm dimethyl disulfide for the fishmeal dryer exhaust gas, and 0.03 ppm carbonyl sulfide, 4.2 ppm hydrogen sulfide, 0.02 ppm carbon disulfide, 5.2 ppm methyl mercaptan, and 0.09 ppm dimethyl disulfide for the fish cooker exhaust gas. As the aliphatic amines, only trimethylamine was identified from both exhaust gases, and the detected concentration was 0.42 ppm and 1.0 ppm for the exhaust gases from the fishmeal dryer and cooker respectively.

54674 **APTIC NO. 77136**

Hoshika, Yasuyuki, Ichiro Kozima, Kazumi Koike, and Kenji Yoshimoto

ANALYSIS OF THE SULFUR COMPOUNDS IN THE EXHAUST GASES FROM TWO CORN STARCH FACTORIES. *(Tomorokoshi denpun seizo kotei kara no haiki gasu chu no iou kagobutsu no kenshutsu). Text in Japanese. Yukagaku (J. Japan Oil Chem. Soc.), 24(5):317, 1975.*

The measurement results of sulfur compounds in the exhaust gases from an automated and unautomated corn starch factory are presented. The exhaust gas was trapped with liquid oxygen by means of a direct cold trap, and analyzed for carbonyl sulfide, hydrogen sulfide, carbon disulfide, methyl mercaptan, dimethyl sulfide, and sulfur dioxide by gas chromatography equipped with a flame photometric detector and with 25% tris 2-cyanoethoxy propane on a Shimalite column. The average levels found from the unautomated factory were 0.025 ppm carbonyl sulfide, 1.3 ppm hydrogen sulfide, 0.01 ppm carbon disulfide, and 0.45 ppm methyl mercaptan, while the values found from the automated factory were 0.02 ppm carbonyl sulfide, 0.02 ppm hydrogen sulfide, 0.01 ppm methyl mercaptan, and 0.004 ppm carbon disulfide. The sulfur dioxide and dimethyl sulfide could not be seaprated by the GC, and their retention times coincided. When the GC peak was assumed as SO_2, the unautomated factory indicated 0.2 ppm SO_2, while the automated factory showed more than 680 ppm SO_2.

54675 **APTIC NO. 76921**

Hosokawa, Y., S. Izumi, M. Chinda, K. Nakajima, and T. Seki

REPORTS OF THE ACTUAL OFFENSIVE ODOR. *(Akushu no jittai chosa hokoku). Text in Japanese. Aomori-ken Kogai Senta Shoho (Rep. Environ. Pollut. Control Cent. Aomori Prefect.), no. 1:82, Feb. 1975.*

The quantitative results of the measurement of odorous compounds for 59 typical odorous sources including kraft-pulping, chicken farm, pig farm, and fish processing factories in the Aomori Prefecture are summarized. The compounds measured were ammonia, hydrogen sulfide, methyl mercaptan, methyl sulfide, and trimethylamine, and the analytical methods used were similar to techniques specified by the Environmental Agency. In Aomori Prefecture, the environmental standard for odorous compounds established was 0.02 ppm for hydrogen sulfide, 0.01 ppm for methyl sulfide, 0.004 ppm for methyl mercaptan, and 1.0 ppm for ammonia at the boundary of the odor source sites, however, no standard for trimethylamine is yet established. The levels of odorous compounds found varied widely, and the highest concentrations found were 2.9 ppm for ammonia, 0.031 ppm for hydrogen sulfide, 0.0079 ppm for methyl mercaptan, and 0.0461 ppm for methyl sulfide; however, most sources investigated showed values within the standards. The trimethylamine ranged between 0.006 to 0.056 ppm.

54676 **APTIC NO. 75900**

Hughes, T. W., D. A. Horn, C. W. Sandy, and R. W. Serth

SOURCE ASSESSMENT: PRIORITIZATION OF AIR POLLUTION FROM INDUSTRIAL SURFACE COATING OPERATIONS. *Mosanto Research Corp., Dayton, Ohio, Dayton Lab., Environmental Protection Agency Contract 68-02-1320, Task 14, Program Element 1AB015,* ROAP 21AXM-011, Rept. EPA-650/2-75-019-a, MRC-DA-487, 317p., Feb. 1975. 75 refs.

NTIS: PB 243423/AS

Data on atmospheric emissions (particulate and gaseous) from industrial surface coating operations, excluding automobile and architectural painting, are reported as part of an effort to establish a priority level for such emissions. A prioritized listing of industrial surface coating sources of air pollution is presented based on 10 product-type categories. Airborne emissions total 13,000 million kg/yr for major appliance finishing, small appliance finishing, farm machinery finishing, industrial machinery finishing, commercial machinery finishing, wood furniture finishing, sheet, strip, and coil coating, metal furniture finishing, paper and paperboard coating, and fabric treatment. Sheet, strip, and coil coating, paper and paperboard coating, and fabric treatment account for 95% of the total emissions from the surface coating operations considered. Emission factors are broken down for each type of operation considered. Applicable emission control technology is discussed for each operation.

54677 **APTIC NO. 79349**

Joosten, M. and W. Takens

CONTINUED STUDY OF THE SOILING OF ATMOSPHERIC BURNERS BY DUST. *(Voortgezet onderzoek van de vervuiling door stof aan atmosferische branders). Text in Dutch. Gas, 95(3):75-83, March 1975. 3 refs.*

The mechanism of the soiling of atmospheric gas burners with dust sucked in with the primary and secondary combustion air was studied. The dust concentrations tested were between 0.17 and 1.7 mg/cu m. A relationship was established between the rate of soiling with dust and the time constant of the burner (period of time during which the difference in the quality of the combustion drops to 37% of the difference between the initial and final values). Soiling with dust leads to the stoppage of atmospheric gas burner ports, which results in an increase in the soot and carbon monoxide emissions. Soiling with dust can be abated by the use of an air filter, by deflection of the dust particles on sharp edges, and by combustion of the dust sucked in on the inside wall of the burner.

54678 **APTIC NO. 79409**

Kadowaki, M.

ENVIRONMENTAL POLLUTION PROBLEMS AND ITS EDUCATION. *(Kogai mondai to kogai kyoiku). Text in Japanese. Nippon Shiritsu Kyoiku Kenkyusho Kiyo (Japan Assoc. Priv. School Educ.), no. 10:375-393, March 1975. 22 refs.*

The environmental pollution as a social problem and pollution control education in elementary, junior high, and senior high school are discussed. The curriculum guide for schools, objectives of pollution control education, definition, types, and causes of environmental pollution, responsibility for it, and preservation of the environment are discussed. The pollution problem of urban areas is described with a case study of Kochi city, with typical characteristics of population, industrial concentration, and rapid economic growth. The geographical environment of Kochi city, variation in population, working population by the type of industry, trends in industrial development, functional constitution of the city and degree of concentration are described. The trend in environmental pollution problems concerning air, water, noise, vibration, malodor, and industrial waste disposal are also discussed.

54679 **APTIC NO. 77020**

Kalischer, P.

THE ECONOMIC IMPORTANCE OF ENERGY CONSERVATION AND HEAT RECOVERY. *(Volkswirtschaftliche Bedeutung der Energieeinsparung und Waermerueckgewinnung). Text in German. Heizung Lueftung Haustech., 26(2):47-51, 1975.*

The world reserves of oil, natural gas, coal, oil, and shale are reviewed. Nuclear and geothermal power, tidal and solar energy, and the need for a more economical use of energy are discussed. In the Federal Republic of Germany the ratio between converted primary energy and solar energy was roughly 1 to 50 in 1971. In Munich, the amount of waste heat reached 18 percent of the heat supplied by solar radiation. In absolute numbers, households and small consumers rank first in energy consumption followed by industry and traffic. Through improvement of the insulation of homes, the heat required in homes will be reduced from 100 to 70%. The use of exhaust air from air-conditioning systems as well as using fresh air as heat sources would reduce the heat demand to less than 25%. Also, waste heat from refrigerators and dryers could be re-used.

54680 **APTIC NO. 77165**

Kelly, C. Michael, James J. Schuster, and Edward F. Guinan, Jr.

AIR POLLUTION IMPACT OF A SUBURBAN HIGHWAY SEGMENT. *(Environ. Letters, 8(3):259-281, 1975. 7 refs.*

Design traffic volumes, vehicle emission factors, and meteorological data are used to assess the air quality impact of a suburban limited-access highway segment. Mesoscale effects are determined by emission inventory techniques, and microscale effects are determined using a pollutant dispersion model developed by the California Division of Highways. No direct health effects from microscale dispersion of pollutants for any of four alternate highway alignments are anticipated. The net effect of the highway on mesoscale air pollution levels is also small and represents an improvement with respect to carbon monoxide and hydrocarbons and a degradation with respect to nitrogen oxides. The degradation of mesoscale NOx levels is the most significant air pollution effect of the highway but is not large enough to be considered a factor against construction of the highway. (Author abstract modified)

54681 **APTIC NO. 76949**

Kimura, M.

RELATION BETWEEN COMPOSITION OF MOTOR GASOLINE AND AUTOMOTIVE EMISSION. *(Gasorin no sosei to haishutsu gasu). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan) (Tokyo), 54(580):661-676, Aug. 1975. 34 refs.*

A general discussion is given on the effect of gasoline composition on exhaust gas. The carbon monoxide concentration in automotive exhaust gas mainly depends on the air-fuel ratio, and the gasoline composition has little effect on it. Hydrocarbon concentration in the exhaust gas increases with increasing aromatic HC content in the gasoline. Approximately 30% of the total HC in exhaust gas is from the original HC content in gasoline while the rest results from combustion. Aromatic HC concentration in gasoline has little effect on nitrogen oxide concentration in the exhaust, except that at high load, increase of aromatic HC results in the increase of NOx in the exhaust. Aromatic aldehyde concentration in the exhaust including benzaldehyde is directly proportional to the concentration of aromatic HC in gasoline.

54682 **APTIC NO. 79394**

Klein, David H., Anders W. Andren, Joel A. Carter, Jeul F. Emery, Cyrus Feldman, William Fulkerson, William S. Lyon, Jack C. Ogle, Yair Talmi, Robert I. Van Hook, and Newell Bolton

PATHWAYS OF THIRTY-SEVEN TRACE ELEMENTS THROUGH COAL-FIRED POWER PLANT. *Environ. Sci. Technol., 9(10):973-979, Oct. 1975. 16 refs.*

Coal, fly ash, slag, and combustion gases from a large cyclone fed power plant 870 MW(e) were analyzed for trace elements. The sampling and analyses are generally adequate to describe the flows of these elements through thhe plant. Most mercury, some selenium, and most chlorine and bromine are discharged to the atmosphere as gases. Arsenic, cadmium, copper, gallium, molybdenum, lead, antimony, Se, and zinc are quite concentrated in fly ash compared to the slag, and are more concentrated in the ash discharged through the stack than in that collected by the precipitator. Aluminum, barium, calcium, cesium, cobalt, europium, iron, hafnium, potassium, lanthanum, magnesium, manganese, rubidium, scandium, silicon, samarium, strontium, tantalum, thorium, and titanium show little preferential partitioning between the slag and the collected or discharged fly ash. Chromium, Sc, sodium, nickel, uranium, and vanadium exhibit behavior intermediate between the latter two groups. (Author abstract modified)

54683 **APTIC NO. 79084**

Krumwiede, K. R., D. M. Norton, G. W. Johnston, R. E. Thompson, B. P. Breen, and V. Quan

A PROBING STUDY OF NO FORMATION IN THE FLAME ZONE OF A 175 MW GAS FIRED UTILITY BOILER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975. Paper 75-23.4.)*

Probing measurements of nitric oxide formation in the flame zone of a 175-megawatt gas-fired utility boiler were made. The majority of NO emissions were formed within the first 6 to 10 ft from the burner face (2.5-4 throat diameters) during gas fuel combustion. The NO formation rate was highest in the flame zone between 2 and 3 ft from the burner face for both fuel-rich and unmodified air-rich cases. However, the maximum concentration was lower in the fuel rich cases and was reached much closer to the burner face. Nitric oxide levels in the flame zone approached 80% of the stack NO emissions. The fuel-rich low nitrogen oxide operating mode was characterized by low oxygen and high carbon monoxide levels in the burner core with NO formation limited by the lack of excess O2. (Author abstract modified)

54684 **APTIC NO. 79335**

Llovet, J. E., H. K. Klooster, and D. G. Chapel

REFINERY DESIGN (CIRCA 1984). *Chem. Eng. Progr., 71(6):85-90, June 1975. 1 ref.*

The task force approach to refinery design allows an early comparison of energy saving concepts and systems which must be studied to provide the best combination of energy conservation, environmental control, and plant profit. The economic bases for energy conservation measures are specific to each refinery and depend on numerous factors. An added benefit of low fuel consumption is the reduction of sulfur dioxide emissions in the flue gas. The types, qualities, and quantities of fuel used in fired heaters and boilers determine the amount of SO2 and nitrogen oxides discharged to the atmosphere from a typical modern refinery. Increased use of light hydrocarbon gases and liquified petroleum gas as refinery fuels effectively reduces SO2 emissions and would thus avert potentially costly shutdowns by regulatory agencies during times of adverse meteorological conditions.

54685 **APTIC NO. 77026**

Masek, Vaclav

THE COMPOSITION OF SOLID EMISSIONS DERIVING FROM COKE QUENCHING. *(Zur Qualitaet fester Emissionen beim Koks-Nassloeschverfahren). Text in German. Staub, Reinhaltung Luft, 35(3):87-89, 1975. 7 refs.*

Tests were carried out to assess dust discharge from a quenching tower, with and without four collecting plates. Dust samples were taken from 136 operations of the wet quenching of coke, and divided into 13 test groups. The samples were then analyzed in 4-6 particle fractions with particular regard for the content of ash, sulfur, and 3,4-benzopyrene. Special attention was paid to the respirable dust portion. The fraction below 0.005 mm accounted for 1.15-3.65 wt%. The dust was composed of calcia, silica, alumina, magnesia, and ferric oxide. The 3,4- benzo(a)pyrene content ranged from 37 to 91 micrograms/g in the fraction below 0.005 mm, from 35 to 79 micrograms/g in the 0.005-0.1 mm fraction, from 15 to 30 micrograms/g in the 0.1-0.2 mm fraction, and from 12 to 30 micrograms/g in the 0.2-0.3 mm fraction.

54686 **APTIC NO. 79474**

Masek Vaclav

TOTAL AND FINE DUST MEASUREMENTS AT THE WORKING PLACE. *(Gesamt- und Feinstaubmessungen am Arbeitsplatz). Text in German. Bitumen, Teere, Asphalte, Peche, 26(6):18-21, 1975. 2 refs.*

Mathematically evaluated results of 199 parallel dust concentration measurements carried out at 13 different workplaces in the tar and pitch industry as well as during road surfacing operations by means of two two-stage dust measuring instruments (model DP 50, made in Czechoslovakia, and model BAT I, made in West Germany) are presented. Statistically significant negative correlation was established between the gravimetric concentration of the total dust and of the respirable fraction up to a total dust concentration of 10/mg cu m, i.e., the respirable dust concentration decreased with increasing total dust content. Certain particle shapes in dust samples from the tar and pitch industry approached the ideal spherical shape.

54687 **APTIC NO. 79126**

Mayrsohn, Henry, Mutsuo Kuramoto, James H. Crabtree, Ray D. Sothern, and S. Henry Mano

HYDROCARBON COMPOSITION OF LOS ANGELES GASOLINES 1974. *California Air Resources Board, El Monte, Atmospheric Studies Section, 28p., Feb. 1975.*

Analyses of gasoline samples obtained in the Los Angeles, California area during 1974 are described. The 1974 distributions appear to reflect the modifications made recently by the refiners in order to satisfy changing fuel composition requirements. The aromatic content of no-lead gasoline shows a slight increase in comparison to previous years, while the aromatic contents of regular and premium gasolines show decreases. These decreases are accompanied by a corresponding increase in the paraffinic contents. Aromatic, paraffinic, and olefinic percentages (by volume) are respectively: 34.4, 61.9, and 2.9 for no lead gasoline; 29.0, 63.5, and 6.6 for regular gasoline; and 31.5, 61.2, and 6.4 for premium gasoline.

54688 **APTIC NO. 77251**

Nakajima, T. and S. Tabuchi

INVESTIGATION OF ODOR IN ENVIRONMENTS AND EMISSION SOURCES. *(Kankyo to hasseigen no akushu chosa). Text in Japanese. Hokkaido Kogai Boshi Kenkyusho Ho (Rep. Hokkaido Res. Inst. Environ. Pollut.), no. 1:171-175, March 1975. 1 ref.*

Investigations of odors were carried out at U poultry waste treatment plant, H chemical plant, and O kraft paper plant. Ammonia, trimethylamine and sulfur compounds were sampled by sulfuric acid-treated filter paper (7 cm) at 5 l/min suction rate. Stack gas was sampled by using a 100 cm syringe. Ammonia was analyzed by the pyridine-pyrazolone method, and trimethylamine and the sulfur compounds were analyzed by gas chromatography. The NH3 concentrations at U plant ranged from 0.6 ppm to 0.7 ppm and those at 50 m to 200 m in the downstream direction ranged from 0.1 ppm to 0.7 ppm. The NH3 concentrations at H plant were trace levels to 0.3 ppm. The highest trimethylamine, hydrogen sulfide, methyl mercaptan, and dimethyl sulfide were found to be 0.023 ppm at U plant, 0.17 ppm at H plant, 0.131 ppm at H plant, and 0.02 ppm at O plant, respectively. The methyl mercaptan and dimethyl sulfide concentrations in stack gas from a wooden kettle of O plant were 19,100 ppm and 13,100 ppm, respectively.

54689 **APTIC NO. 79571**

Nakano, H., I. Usami, Y. Imamura, T. Ishibashi, T. Kato, A. Fujioka, K. Hori, and K. Sato

VEHICLE EXHAUST EMISSION GAS CHECKING SYSTEM. *(Jidosha haishutsu gasu kensa sisutemu). Text in Japanese. Fujitsu, 26(5):705-718, 1975.*

As a part of Toyota Total Clean System, the Emission Check and Analysis System (ECAS) was developed as a quality assurance test. The ECAS comprises an End of Line Emission Check Out System and Quality Audit Test System, which is controlled by a FACOMU-200 computer system. Descriptions of the hardware and software system of FACOMU-200 which controls line equipment, an emission gas analyzer, data collection, calculation, evaluation, instruction for correction, and on-line transmission are given. The ECAS system is installed at the shipment site; however, the data obtained are transmitted to the central computer system, processed, and necessary informations are transmitted by feedback to appropriate production processes. Some of the characteristics of ECAS are accurate and speedy analysis of emission gas, reduction in irregularity in measurement, application of various test methods, improvement in quality assurance by prompt feedback of information for necessary correction, high accuracy of data processing, checking of emission control devices, and standardization of test methods.

54690 **APTIC NO. 79210**

Natusch, David F. S.

CHARACTERIZATION OF ATMOSPHERIC POLLUTANTS FROM POWER PLANTS. *Preprint, Illinois Univ., Urbana, 23p., 1975. 28 refs.*

Approximately 80% of the electric power generated in the United States is derived from the combustion of fossil fuels. Without controls, the amount of sulfur oxides emitted from a power plant is directly related to the sulfur content of the fuel burned. While sulfur may initially be gasified as hydrogen sulfide or atomic sulfur, rapid high temperature oxidation of these species to sulfur dioxide occurs during and immediately following combustion. Approximately 95% of the sulfur present in fossil fuels is emitted as sulfur oxides. Nitrogen oxides produced by fossil fueled power plants are derived primarily from oxidation of atmospheric nitrogen in the combustion feed air. The extent of nitric oxide formation depends primarily upon the oxygen and N2 contents of the feed air, the combustion temperature, and the average residence time of the oxygen and nitrogen molecules in the combustion zone. Carbon monoxide emissions from fossil fueled power plants do not contribute greatly to the anthropogenic CO inventory. Oil and natural gas have much lower particle emission factors than coal. There is little definitive information at present about the chemical forms of trace elements in fly ash and about the mass median diameters of emitted trace elements. The exact nature and extent of emissions of particulate organic species from fossil fueled power plants is not well established. Fossil fueled power plants also emit a very wide variety of other pollutants in more or less minor amounts, including gaseous hydrocarbons, aldehydes, and sulfuric and hydrochloric acid mists.

54691 **APTIC NO. 79567**

Naughton, J. J. V. Lewis, D. Thomas, and J. B. Finlayson

FUME COMPOSITIONS FOUND AT VARIOUS STAGES OF ACTIVITY AT KILAUEA VOLCANO, HAWAII. *J. Geophys. Res., 80(21):2963-2966, July 20, 1975. 22 refs.*

The particulate and gaseous composition of the fume cloud as it issued from an erupting volcanic vent at Mauna Ulu on the east rift zone of Kilauea Volcano, Hawaii was investigated. Similar measurements were made at Halemaumau, the summit crater of Kilauea, during non-eruptive periods from nearby fissures erupting on the floor of Kilauea caldera. Fume was collected at Kilauea Volcano with equipment patterned after that used in industrial pollution studies. The chief components are sulfur dioxide, sulfur tetraoxide, chlorine, sodium, calcium, potassium, fluorine, magnesium, and iron in that order of decreasing concentration. Content and order of abundance vary depending on the state of activity of the volcanic sources of the fume. Sulfur compounds are preponderant. (Author abstract modified)

54692 **APTIC NO. 79355**

Okita, T.

NOX AND ENVIRONMENTAL PROBLEMS. *(NOx to kankyo mondai). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 39(9):464-472, Sept. 1975. 8 refs.*

Complex problems of nitrogen oxides pollution and its effect on the natural environment are reviewed. Subjects discussed are types and characteristics of nitrogen compounds in the atmosphere, particularly NOx, the recycling system of N compounds in nature, reactions of NOx in the atmosphere including photochemical reactions and yearly variations in nitric oxide and nitrogen dioxide, effects of NOx on living bodies including physiological effects of NO2 (symptoms, NO2 concentration, NO2 exposure time), effects of NOx on plants (susceptibility to NO2), and effects of NOx on objects such as fibers (dyes and additives) and nickel-brass alloy.

54693 **APTIC NO. 77184**

Penkala, Stanley J. and Gilberto De Oliveira

THE SIMULTANEOUS ANALYSIS OF CARBON MONOXIDE AND SUSPENDED PARTICULATE MATTER PRODUCED BY CIGARETTE SMOKING. *Environ. Res., 9(2):99-114, April 1975. 15 refs.*

Carbon monoxide and suspended particulate matter produced by a cigarette smoking machine were monitored simultaneously in a nonventilated but well mixed exposure chamber of 9.2 cu m. Measured concentration decreases for CO and suspended particulates were substantial and significantly different, amounting to 84 and 43 min, respectively. The difference in removal rates indicated that CO cannot be used as a tracer for suspended particulates in enclosed spaces without a correction. Generation rates of CO and suspended particulates were estimated to be 82.7 and 17.2 mg/ cigarette, respectively. The CO results agreed well with other studies, while the values for suspended particulates were somewhat lower than data obtained by immediate filtration methods. Normal cigarette smoking (one pack/day) was estimated to raise the particulate concentration in an occupied space above the ambient air quality annual standard (0.075 mg/cu m) and above the 24-hour standard (0.260 mg/cu m) in all but the best ventilated conditions. The CO standard was not exceeded except for situations in which a room was sealed to prevent normal ventilation by air infiltration. (Author abstract modified)

54694 **APTIC NO. 79561**

Pereira, Martin Rodgrigues and M. Aaron Benjaminson

BROADCAST OF MICROBIAL AEROSOLS BY STACKS OF SEWAGE TREATMENT PLANTS AND EFFECTS OF OZONATION ON BACTERIA IN THE GASEOUS EFFLUENT. *Public Health Rept. US, 90(3):208-212, May-June 1975. 23 refs.*

The microbial pollution of the air by stacks of sewage treatment plants and effects of ozonation on bacteria in the gaseous effluent were investigated. The bubbling of air into aeration tanks causes some of the bacteria concentrated at the liquid air interface to become airborne. These bacteria are found in great numbers in the atmosphere of aeration buildings. The air currents created by fans in the wall of the buildings and in the exhaust stacks carry number of bacteria into these stacks and from there into the outside air. Among these bacteria are viable potential respiratory pathogens. Ozonation does not appreciably attenuate these aerosols.

54695 **APTIC NO. 77287**

Porter, J. F., F. C. Alley, and J. R. Grubbs, Jr.

ANALYSIS OF FLUE GAS EMISSIONS FROM TENTER FRAME OPERATIONS PROCESSING SYNTHETIC FABRICS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-20.5.)*

Results from an analysis of flue gas emissions generated by a tenter frame operation processing synthetic fabrics are presented. Particulate and gaseous pollutants contributing to oily smoke emissions were identified as resulting from two sources. One was the finishing chemical used by the textile plant, and the other was the spin finishes applied to the fiber by the fiber manufacturer. Recommendations for lowering emission levels include: improvements in scouring to eliminate spin finishes, the use of spin finishes which are more water soluble, and control of the temperature in the drying range to minimize smoke emissions. Descriptions of the sampling procedures used are provided along with the stack gas analysis results.

54696 **APTIC NO. 79386**

Raison, M., J. L. Sanson, and C. Aubin

RECOVERY OF HYDROCARBON LOSSES IN STORAGE AND FILLING PROCESSES IN REFINERIES. *(La recuperation des partes d hydrocarbures dans les stockages et chargements des raffineries). Text in French. Inform. Chim., no. 145:291-296, June 1975.*

The evaporation losses of hydrocarbons during storage and filling operation in French refineries are estimated, and technical and economic aspects of adequate control measures are discussed. The evaporation losses of high-test gasoline, regular gasoline, benzene, and toluene are estimated at around 0.0002-0.00008% from storage tanks, and around 0.000002-0.0015% during filling. The use of efficient vapor recovery in filling installations may help save 15,000 tons of petroleum products annually.

54697 **APTIC NO. 77263**

Robertson, A. F.

ESTIMATING SMOKE PRODUCTION DURING BUILDING FIRES. *Fire Technol., 11(2):80-94, May 1975. 11 refs.*

The specific optical density is used to characterize the quantity of smoke. It is regarded as an approximation because of the uncertainty as to the thermal exposure conditions in an actual fire. Smoke production is calculated for furnishings, doors, ceiling, walls, and floor of two hypothetical rooms. It is assumed that smoke produced by different materials is additive and that smoke production can be estimated on the basis of tests on samples of different geometry. Thermal exposure and spread of smoke under actual fire conditions are discussed. An appendix describes in more detail the assumptions and considerations involved in the calculations.

54698 **APTIC NO. 76954**

Saito, T.

UNLEADED GASOLINE. *(Gasorin no muenka). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan) (Tokyo), 54(580):653-660, Aug. 1975. 11 refs.*

A general discussion is given on unleaded gasoline. Unleaded gasoline is known to cause valve seat recession due to the friction loss of the valve seat. New evidence has shown that poisoning of oxidative catalysts are due to scavenger rather than the tetraethyl lead. The research octane number (RON) of unleaded regular gasoline can be maintained at 91-93 by changing the mixing ratio of the basic materials. To maintain the octane number of premium gasoline at the level of 97-98, it is necessary to change the composition of the gasoline considerably. Future automobiles in Japan are to be designed in such a way that premium gasoline with an octane number of 95 can be used. The increase of aromatic hydrocarbon concentration in gasoline to increase its octane number results in an increase of aromatic HC concentration but a decrease of olefin concentration in the exhaust gas.

54699 **APTIC NO. 79475**

Schumm, Hans Peter

MONITORING OF THE CO CONCENTRATION IN LARGE GARAGES. *(Ueberwachung der CO-Konzentration in Grossgaragen). Text in German. Heizung Lueftung Haustech., 26(4):143-144, 1975.*

The carbon monoxide concentration were registered in a large two-level garage by means of thermal effect analyzers. The garage is equipped with a modern ventilation system according to the corresponding legal regulations. Ventilation stage 1 is turned on as soon as a CO level of 50 ppm is reached, an a higher level (80) triggers stage 2 of the ventilation system. The recorded data, obtained with two recorders arranged in different points of the garage, shows relatively slow dispersion and elimination of CO within the garage when generated in high concentrations. The findings also indicate that twin analyzers are not suitable for CO monitoring in garages.

54700 **APTIC NO. 79524**

Shaposhnikov, Y. K., V. M. Kisarov, V. B. Saltanova, M. I. Novokovskaya, and E. I. Kirillova

DETERMINATION OF VOLATILE PRODUCTS GENERATED DURING THE PROCESSING OF POLYPROPYLENE, PVC AND ACRYLONITRILE BUTADIENE STYRENE MATERIALS. *(Opredelenie letuchikh produktov pri pererabotke polipropilena, PVKh- i ABS-plastikov). Text in Russian. Plast. Massy, no. 5:37-38, 1975.*

Air samples from shops in which polypropylene, PVC (polyvinyl chloride), and acrylonitrile butadiene styrene are processed were analyzed for organic substances. The air of polypropylene processing shops contained pentenes (10 mg/cu m), aliphatic aldehydes (20 mg/cu m), acetic acid (25 mg/cu m), carbon monoxide (20 mg/cu m), propionic acid (11.3 mg/cu m), butyric acid (8.7 mg/cu m), butyl propionate (4.27 mg/cu m), butanol (1.21 mg/cu m), and amyl alcohol (0.85 mg/cu m). The waste gases generated in PVC processing shops contained large amounts of hydrochloric acid and dichloroethane. It is best to use activated carbon for the removal of these substances from the waste gases, while the waste gases generated in polypropylene processing shops should be incinerated catalytically. The ABS polymers released negligible quantities of organic substances. Here, waste gas cleaning, if necessary, is best done by catalytic incineration.

54701 **APTIC NO. 79529**

Smejkal, Jiri and Jindrich Bartonek

ANALYSIS OF SULFUROUS EMISSIONS FROM KRAFT PULP PRODUCTION BY MEANS OF SORBENT SOLUTION AND COULOMETRY. *(Analyza sirnych emisi privyrobe sulfatove buniciny pomoci sorpcnich roztoku a coulometrie). Text in Czech. Papir Celuloza, 30(1):27-29, Jan. 1975. 13 refs.*

Selective properties of sorbent solutions recommended by Thoen, with some modifications, were tested by coulometric method for applicability to a quantitative analysis of contents of sulfur dioxide, hydrogen sulfide, methyl mercaptan, dimethyl sulfide and dimethyl disulfide present in emissions during manufacturing of kraft pulp. The coulometer (designed by Sevcik) used in the experiments was capable of measuring 5-150 ppm of sulfur dioxide at a flow rate of 0.4 l/min. Commercial chemical compounds were tested by two methods: water or ethanol solutions of known compounds were delivered directly to a measuring cell; the same solutions were inserted into an impinger through which 40 liters of air were pumped and then analyzed by the coulometer. It was established that the sorbent solution method is convenient for analysis of individual contents of sulfur dioxide, hydrogen sulfide, and methyl mercaptan, but that more suitable methods exist for analysis of other substances. The Sevcik coulometer was suitable, but required some structural modifications such as addition of a combustion chamber for conversion of other sulfurous compounds of sulfur dioxide prior to analysis.

54702 **APTIC NO. 77294**

Smith, William H.

LEAD CONTAMINATION OF THE ROADSIDE ECOSYSTEM. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-18.1.)*

Lead contamination of the atmospheric, edaphic, and vegetative components of the roadside ecosystem is discussed. The size of this ecosystem approximates 118,000 sq mi in the United States. Vehicles release approximately 80 mg/km lead to the atmospheric compartment in the form of inorganic lead salts rangine in size from 1-5 micron. The lead content of roadside atmospheres may be elevated 2-20 times that of non-roadside atmospheres. Sedimentation from the atmospheric compartment results in lead contamination of the soil and vegetative compartments. Lead in the upper 5 cm of the soil profile may be elevated 30 times that of non-roadside soil within a few m of a street or highway. The soil lead is largely bound by organic matter exchange sites or present as the relatively insoluble lead sulfate. The increased lead burden of plants, largely due to surface deposition, may be 5-20, 50-200, and 100-200 times baseline lead levels for unwashed agricultural crops, grass, and trees, respectively. Most plant studies demonstrate a strong inverse correlation between plant lead level and sampling distance normal to the highway and a less strong, but direct, correlation between lead burden and traffic volume. (Author abstract modified)

54703 **APTIC NO. 77162**

Stewart, D. B., P. Morgan, and E. D. Dainty

SOME CHARACTERISTICS OF PARTICULATE EMISSIONS IN DIESEL EXHAUST. *Can. Mining Met. Bull. (Montreal), 68(756):62-69, April 1975. 9 refs.*

Particulate emissions from three different diesel engines derated for underground service were characterized with the aid of a gravimetric particulate sampling system. The total particulate exhaust concentration for derated engines reached 150 mg/cu m and was dependent on the particular engine type. The diesel-generated particulates were virtually 100% respirable, with essentially all of the particles being below 0.5 micron in size. The smallest particles, 0.05 micron in size, were the building blocks from which diesel-generated particles appeared to form. Annular radial-flow catalytic purifiers reduced the size of the large agglomerates but did not appear to burn or permanently store any of the diesel-generated particulates. Catalytic purifiers added a small amount (less than 25 mg/cu m) of inorganic non-respirable particulates to the engine exhaust which appeared to result from catalyst support attrition. Particulates and nitric oxide were the two largest individual toxic components found in the exhaust from diesel engines derated for underground services. (Author summary modified)

54704 **APTIC NO. 76973**

Sugiura, K.

NEW DISCOVERY: CADMIUM POLLUTION BY TIRE ABRASION. *(Shinhakken: taiya mamo ni yoru kadomiumu osen). Text in Japanese. Keizai (Econ.), no. 137:70-85, Sept. 1975. 7 refs.*

For the purpose of investigating the heavy metal, particularly lead, pollution due to automotive exhaust emission, the Pb, cadmium and zinc contents in trees and soil at locations near the highway were determined. The tree sample was separated by the annual ring and heavy metal contents were determined by atomic absorption spectrophotometry. The variation in Pb concentration from 1931-1971 showed a definite correlation with the variation in traffic volume, and surprisingly a similar correlation was found between Cd concentration and traffic volume. The investigation on the emission source of Cd from automobiles revealed that tire thread contained an average 13.5 ppm of Cd, 43.5 ppm of Pb, and 10,200 ppm of Zn, which are spread into the air by abrasion. The Cd, Pb, and Zn contents in soil also showed definite correlations to the traffic volume.

54705 **APTIC NO. 77061**

Suzuki, G., R. Ando, H. Yoshikoshi, Y. Yamaoka, and S. Nagaoka

MINIMIZATION OF NOX IN THE GAS DISCHARGED FROM SINTERING PLANTS. *(Shoketsuki no haigasuchu NOx no teigen ni tsuite). Text in Japanese. Preprint, Japan Society Iron and Steel, Tokyo, p. 51, 1975. (Presented at the Japan Society Iron and Steel, Annual Meeting, 89th, Tokyo, Japan, April 4-6, 1975.)*

Quantitative studies were made on the origins of nitrogen oxides in waste gases from a sintering plant. Nitrogen oxides comes from nitrogen in fuel and from the combustion of air and nitrogen. The amount of NOx formed thermally during combustion was estimated by means of a simulation model of the sintering process. The amount of NOx in the waste gas was determined for cokes with various nitrogen contents. The formation of thermal NOx during combustion was very slight. The amount of nitric oxide formed in sintering was almost proportional to the nitrogen content of the coke used. However, some NO was formed even by the sintering with coke containing no nitrogen. This is due to the nitrogen present in the ore. Therefore, removal of nitrogen from the coke reduces the formation of NOx during sintering, but the nitrogen in the ore determines the lower limit of the NOx concentration. When a coke containing 0.21% N was used for actual sintering, thee concentration of NO in the discharged gas was about one third of that found when coke containing 0.9% N was used.

54706 **APTIC NO. 79334**

Takenaka, S.

ENFORCING SITUATION OF ENVIRONMENTAL POLLUTION CONTROL AT AKASAKA AREA. *(Akasaka chiku no kogai taisaku jisshi jokyo). Text in Japanese. Sekkai (Lime), no. 235:22-24, July 1975.*

Akasaka area is a small town at the foot of Kinsei mountain with slaked lime plants where many large kilns are operated with heavy oil. The pollution control agreement between Ohgaki city and the slaked lime plants concerning water pollution (pH, suspended solids), air pollution (suspended particulates) and noise pollution was established in Jan. 1971, followed by the pollution control agreement with all industries in Ohgaki city established in May 1973. All waste water is recirculated in a closed system, and poses no problem at present. The suspended particulate concentration is 0.2-0.3 mg/N cu m. The emission concentration is 0.03-0.04 g/N cu m after the wet type dust collecting treatment. The noise level inside of the plant is 80-85 horns, while it is 55-57 horns outside of the plant which is close to the standard noise level of 45-47 horns in the residential area.

54707 **APTIC NO. 79055**

Thibodeaux, Louis J.

AIR-STRIPPING OF ORGANICS FROM WASTEWATER. *Preprint, American Inst. of Chemical Engineers, New York, 64p., 1975. 38 refs. (Presented at the Complete Watereuse: Water s Interface with Energy, Air, Solids, National Conference, 2nd, Chicago, Ill., May 5-8, 1975.)*

The air-stripping of organic compounds from industrial wastewater is discussed, with particular emphasis on the volatile fractions. Topics covered include: the thermodynamic basis for desorption and stripping, laboratory tests methods for volatile component stripping, the identification and quantification of volatile organics in wastewater, the use of cooling towers for air stripping, the design of aerated stabilization basins, and combined biological and air-stripping treatment operations. Data on the nature and quantity of volatile fractions in wastewater are provided to allow for estimates of the importance of species desorption as an air pollution source. The volatile fraction data also provide information on the extent of the odor nuisance associated with such operations. Volatility data are provided for such compounds as aldehydes, organic acids, alcohols, ketones, and organic sulfur compounds.

54708 **APTIC NO. 79570**

Toda, T. and T. Akiyama

DOMAIN OF ENGINE OPERATION IN EXHAUST EMISSION EVALUATING TEST MODE. *(Haiki taisakusha no enjin unteniki). Text in Japanese. Toyota Gijutsu (Toyota Eng.), 24(4):602-608, July 1975. 2 refs.*

The domain of engine operation was defined as the variation range of engine variables such as number of revolutions, torque, temperature, pressure, flow rate, and exhaust emission variation of engines operated at certain driving modes. As engine operation variables, the number of revolutions of the engine, negative pressure of the intake manifold, throttle opening, torque, vehicle speed, fuel consumption quantity, and exhaust gas composition were selected. Descriptions of measurement methods and measurement instruments are given. Data obtained were analyzed using a computer for the time variation of each phenomenon, relative variation of two selected phenomena, and frequency distribution. As factors affecting the domain of engine operation, the driving pattern, driving conditions such as transmission ratio, gear ratio and tire size, and engine output are discussed. Application to the determination of conditions for optimal engine performance, emission control, and fuel economy is also discussed.

54709 **APTIC NO. 79572**

Uchimura, R.

POLLUTION CAUSED BY PETROCHEMICAL COMPLEX: STYRENE MONOMER PLANT. *(Kagaku konbinato no kogai (2) Suchiren monoma kojo). Text in Japanese. Gijutsu to Ningen (Tech. Human Being), 4(10):153-157, Oct. 1975.*

As a part of the study on pollution caused by a petrochemical complex, pollutants emitted from a styrene monomer production plant were investigated. The production process of styrene by the UOP method is described with a flow sheet, and the type and concentration of pollutants in exhaust gas from alkylation processes, waste water from the benzene tower, flue gas from the furnace for producing superheated steam, exhaust gas from the cooling tower attached to the dehydrogenation reactor, waste water of condensed superheated steam, high boiling point waste product (tar), used catalyst, used adsorbent, and water from the steam ejector and cooling system are given.

54710 **APTIC NO. 79413**

Vodicka, V.

WET/DRY COOLING WITH WET/DRY CONSTRUCTION ELEMENTS. *(Nass-Trockenkuehlung mit NTB-Elementen). Text in German. VGB Kraftwerkstechnik, 55(5):314-317, 1975.*

Combined wet and dry cooling towers with wet and dry construction elements for power plants to prevent visible vapor emissions are described. Parallel connection of the cooling elements is the optimal solution, while series connection is not expedient. As combined wet and dry cooling towers with constant ratio of the wet and dry cooling surfaces have to be oversized due to the seasonal temperature variations, those with a variable ratio of the wet and dry cooling surfaces, provided with control organs, can be used as dry cooling towers in winter, and totally as wet type cooling towers in summer. The wet/dry construction elements can be used in counterflow and cross- current type cooling towers as well.

54711 **APTIC NO. 79476**

Yamaguchi, T.

SYSTEMS APPROACH TO POLLUTION-FREE PETROLEUM REFINERY. *Preprint, World Petroleum Congress, Tokyo, Japanese Organizing Committee, 7p., 1975. (Presented at the World Petroleum Congress 9th, Tokyo, Japan, 1975.)*

A case study on the design of pollution-free refineries able to supply sufficient clean energy without adverse effect on the environment was made. A model refinery is described, including the capacity, the composition of crude oil, the process scheme, the products, and the quality of the main products. The measures that minimize pollution are listed. Both noise and water pollution are considered as welll as air pollution. Results are given for all three categories. No technical problems are expected in establishing the pollution-free refinery system, because only currently available processes and equipment are considered in the study. The pollution- free refinery system recommended by the committee will be considered as a standard refinery model. (Author abstract)

54712 **APTIC NO. 77023**

Yanagihara, Hiromichi

RESEARCH STUDY ON THE EXHAUST EMISSIONS OF A DIESEL ENGINE DURING COLD-STARTING. *(Untersuchung der Abgasemission eines Dieselmotors beim Kaltstart). Text in German. Motortech. Z. (Stuttgart), 36(7/8):220-224, 1975. 5 refs.*

During the cold-starting phase of an air-cooled single cylinder diesel engine, the main emission constituents and the aldehyde content were analyzed for separate power cycles at ambient temperatures between -20 and +20 C. The samples of exhaust gases were collected by a sampling tube from the exhaust valve in four glass cells opened successively by solenoid valves. The main exhaust gas constituents of the power cycles was measured by gas chromatography. The dependence of density and kinematic viscosity of diesel fuel on ambient temperature, as well as the dependence of injection quantity per needle lift on speed were investigated. At the beginning of ignition during cold-starting, the injection quantity was not significant. The starting speed, which decreases with decreasing ambient temperature, is responsible for affecting mixture formation. The portion of droplets having a diameter of less than 50 microns was 50% at 200 rpm, and 2% at 100 rpm.

54713 **APTIC NO. 79419**

Zyul karneeva, S. Y., M. D. Smotrakova, V. V. Yurov, L. M. Rabinovich, and V. I. Sablin

AIR POLLUTION SOURCES IN THE PRODUCTION OF SYNTHETIC FAT SUBSTITUENTS. *(istochniki zagryazneniya atmosfery pri proizvodstve SZhK). Text in Russian. Neftepererab. Neftekhim., no. 4:47-48, 1975. 4 refs.*

The sources of air pollutant emissions in the production of synthetic fat substituents were studied. Aldehydes, acids, alcohols, and esters were identified as the major air pollutants emitted. The technological equipment, and facilities related to the discharge and treatment of wastewaters, such as percolation fields for sludge and sulfate, and the biochemical wastewater treatment plant are the major emission sources. The air quality can be improved in synthetic fat substitute production plants by abandoning waste water discharge on percolation fields, by the recovery of sodium sulfate from the wastewater, by the destruction of the activated sludge and other sludges, and by the use of airtight canalization.

54714 **APTIC NO. 79078**

Environmental Protection Agency, Washington, D. C., Office of Mobile Source Air Pollution Control

SUMMARY REPORT ON THE EVALUATION OF LIGHT DUTY DIESEL VEHICLES. *56p., March 1975.*

The testing of eleven different diesel powered light duty vehicles is summarized. The 1975 Federal Test Procedure for hydrocarbons, carbon monoxide, and nitrogen oxides emissions and urban cycle fuel economy, highway cycle tests for emissions and fuel economy, mapping of HC, CO, and NOx emissions and specific fuel consumption, smoke tests, oxygenates testing, noise tests, particulate emission tests, hydrocarbon distribution tests, and acceleration performance tests were used. Test results are given. The light duty diesel powered vehicle can meet the stringent 1977 statutory standards for HC, CO, and NOx without add-on type controls. Fuel economy is superior to the gasoline engine. Oxygenates should not present any major problems except for some contribution to exhaust odor quality. Exhaust smoke should be below the threshold of visibility for most operating modes. The light duty diesel vehicle is not necessarily noisier than equivalent gasoline powered vehicles. Particulate emissions are higher than from a non-leaded gasoline fueled engine of equivalent size. Acceleration performance of the current light duty diesel powered cars is not as good as typical gasoline engine powered cars.

54715 **APTIC NO. 79307**

TABLE OF EXHAUST GAS EMISSION LEVELS FROM AUTOMOBILES WHICH MEET 1975 AUTOMOTIVE EXHAUST GAS LEVEL STANDARDS. *(Sudeni shitei to natta 50-nendo kisei tekigosha jidosha haishutsu gasu reberu ichiranhyo). Text in Japanese. Unyusho (Ministry of Transport), vol. 1975:1-5, June 16, 1975.*

Exhaust gas emission levels (nitrogen oxides, hydrocarbons, and carbon monoxide) under 10-mode and 11-mode conditions have been tabulated for 25 automobile models from five automakers: Toyo Kogyo (Mazda); Hoda Gijutsu Kogyo (Honda CVCC); Mitsubishi Jidosha Kogyo (Colt, Lancer); Toyota Jidosha Kogyo; and Nissan Jidosha. All of these automobiles more than met 1975 average emission level standards for NOx (10-mode, 1.20 g/km; 11-mode 9.00 g/test); HC (10-mode, 0.25 g/km; 11-mode, 7.00 g/test); and CO (10-mode, 2.10 g/km; 11-mode, 60.0 g/test). The lowest emission levels (10-mode) were as follows: NOx (0.5 g/km), (Mazda, Honda CVCC); HC (0.02-0.03 g/km), (Mazda, Honda CVCC, Mitsubishi); and CO (0.05-0.06 g/km), Toyota VG 21 (Toyota Century), Nissan 330 (Cedric Gloria)). Gasoline consumption ranged from 8.5 km/l for the Toyota VG 21 (Toyota Century), equipped with improved engine, oxidation catalyst, secondary air injection, exhaust gas recirculation and Mazda RA 13S (Road Pacer), equipped with rotary engine, thermal reactor, secondary air injection to 17.0-18.0 km/l for the Honda SG (Honda CVCC), equipped with torch ignition (secondary chamber stratified combustion)), and 17.0 km/l for the Mitsubishi A 117A (Colt Galant) and Mitsubishi A 77 (Lancer Celeste), equipped with an improved engine, thermal reactor, secondary air injection, and exhaust gas recirculation. Fuel consumption data, furnished by the automakers, were based on a steady speed of 60 km/hr.

54716 **APTIC NO. 79344**

Kumamoto Prefectural Government

PRESENT SITUATION AND CONTROL OF OFFENSIVE ODORS. *(Akushu no genjo to taisaku). Text in Japanese. In: Environmental White Paper in 1974, p. 107-113, June 1975.*

The number of complaints concerning odorous pollutants was 322 cases (27% of total complaints) in 1973. The number of sources in Kumamoto is about 58,000, and 99% are live-stock industries. Average odorous pollutant concentrations (ppm) measured were: hydrogen sulfide, 0.02; mercaptans, 0.07; and methyl sulfide, 0.17 at a kraft pulp mill, H2S, 3.8 at a synthetic fiber mill, ammonia, 2.8 at a chemical fertilizer plant; NH3 1.6 and trimethylamine 0.0032 at a bone-meal plant, and NH3 0.3-42 at the live-stock industries. Measured odorous pollutant concentrations were evaluated in reference to the environmental standard. In spite of the unpleasant odor, the pollutant concentration was only slightly over the environmental standard in the case of live-stock industry.

1974

54717 **APTIC NO. 79223**

Bretschneider, K. and J. Matz

NITROSAMINES IN THE ATMOSPHERIC AIR AND IN THE AIR AT PLACES OF EMPLOYMENT. *(Nitrosamine (NA) in der atmosphaerischen und in der Luft am Arbeitsplatz). Text in German. Archiv Geschwulstforsch., 43(1):36-41, 1974. 5 refs.*

Problems of nitrosamine formation in the gaseous phase, a method for the determination of trace quantities of nitrosamine in the air, and some results of measurements in the atmosphere and working areas are presented. The presence of nitrosamines in the air can be expected whenever nitrogen oxides and secondary amines are present. The formation of nitrosamines can be catalyzed by sulfur dioxide. For the determination of nitrosamines in the air, a large volume of air is led through activated carbon from which they are eluted with diethylether, further concentrated by evaporation, and injected directly on the gas chromatograph with FID. Traces of diethylnitrosamine and dimethylnitrosamine were detected on a workplace where dimethylamine and diethylamine were processed. There, the amine concentrations were very high, but the nitrogen oxides concentrations were very low. Dimethylnitrosamine concentrations between 0.43 and 0.001 ppb were measured in another workplace where nitrogen oxides was present in 40 ppb concentration. Nitrosamines are a problem of occupational hygiene rather than of general hygiene, and they are hazards only in the event of accidents. In free air, nitrosamines are rapidly destroyed by UV radiation.

54718 **APTIC NO. 79219**

Cardinal, M.

EMISSION OF PARTICLES BY COMBUSTION OF HEAVY FUEL OIL IN LARGE BOILERS. *(Emission de particules par la combustion du fuel-oil lourd dans les grandes chaudieres). Text in French. Rev. Ass. Fr. Tech. Petrole, no. 224:104-107, 1974.*

Characteristics of particulate emissions from heavy oil-firing boilers, and methods for their abatement are presented. Soot, formed by the gaseous-phase cracking of hydrocarbons, is usually in a particle size range of 0.02-0.7 micron. Soot is picked up by the flue gases and transported over great distances, and it may adsorb other harmful pollutants. Agglomerated carbon particles, formed by liquid-phase cracking range from 1 to 100 microns in size. Such particles settle in the immediate vicinity of the emission source. Soot can be retained from flue gases by filtration or scrubbing, while mechanical separators are inefficient. Agglomerated carbon particles can be separated mechanically at efficiencies ranging from 60 to 80%. The formation of unburned particulate matter can be reduced by the optimization of the combustion process, including homogeneous fuel distribution, and by the use of water-oil emulsions as fuel.

54719 **APTIC NO. 79390**

Cuong, Nguyen Ba, B. Bonsang, J. L. Pasquier, and G. Lambert

MARINE AND AFRICAN COMPONENTS OF SULFATE AEROSOLS IN THE SOUTHERN HEMISPHERE. *(Composantes marine et Africaine des aerosols de sulfates dans l hemisphere sud). Text in French. J. Rech. Atmospheriques, 8(3-4):832-844, July-Dec. 1974. 27 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Systematic measurements of atmospheric concentrations of radon 222, sulfate aerosols, and sulfur dioxide were made from 1971 to 1973 during the Gallieni and Marion Dufresne cruises. At sea level, south of 35 deg S, concentrations of sulfates are 1 microgram/cu m indicating marine sources. Northward, between 5 and 25 deg S, the easterly circulation pattern makes it necessary to distinguish between the eastern and western African areas. Over the Indian Ocean, higher sulfate concentrations (1.3 micrograms/cu m) also characterized an aerosol marine source. Over the Atlantic, radon concentrations 10 times higher are related to sulfate concentrations greater than 2 micrograms/cu m which are of continental origin.

54720 **APTIC NO. 79228**

Doerr, Wolfgang, Wolf Lanzer, Eugen Weiler, and Herbert Trenkler

POSSIBILITIES OF OBTAINING INFORMATION FROM THE WASTE GAS MEASURED AT THE LD CONVERTER FOR THE CONTROL AND REGULATION OF THE PROCESS. *(Aussagefaehigkeit der Abgasmessungen am LD-Konverter fuer die Prozessueberwachung und Prozessfuehrung). Text in German. Stahl Eisen (Duesseldorf), 94(9):381-386, 1974. 12 refs.*

Methods for the determination of the carbon end point and for the regulation and control of the oxygen blow processes in LD converters are described. The method is based upon the relationship between both carbon and decarburization rate at the end of a blow. The blow process is conducted and controlled on the basis of continuously recorded flue gas carbon monoxide, carbon dioxide, and oxygen analyses. These analytical values are fed into an on-line computer which controls the end stage of the blow process with respect to a pre-set carbon content. Good agreement was obtained between calculations and preliminary experimental measurements.

54721 **APTIC NO. 79159**

Glysson, Eugene A., Claude A. Schleyer, and Dennis Leonard

THE MICROBIOLOGICAL QUALITY OF THE AIR IN AN INCINERATOR ENVIRONMENT. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration Miami, Fla, 1974, p. 87-97. 10 refs. (May 12-15.)*

The microbial content of air within and outside a municipal incineration facility was evaluated using an Andersen sampler and bacteriological media. Dust-borne and droplet-borne bacteria were found to permeat the entire environment of the enclosed facility, with their concentration varying according to the distance from the dust source and the activity level of operations. Outdoor air samples taken 100 ft from the incinerator and on a line with the entrance also revealed the presence of bacteria, with an average value of 10.8 viable particles/cu ft. Some of the bacteria were pathogenic staphylococci. The measurements revealed the need for additional forced ventilation in the refuse unloading area, improved refuse handling methods to minimize dust agitation, and disposable dust masks for personnel.

54722 **APTIC NO. 75916**

Heimler, Bo

BURNING OF WASTE PRODUCTS. AN EVALUATION OF SAVENAS INCINERATION PLANT IN RELATION TO WASTE PRODUCTS, FLUE GAS, ASH, AND SLAG DURING THE PERIOD FROM JUNE 1973 TO MAY 1974. *(Avfallsforbranning. En kartering av savenas forbranningsanlaggning med avseende pa avrall, rokgas, aska och slagg under tiden Juni 1973 - Maj 1974). Preprint, Swedish Water and Air Pollution Research Lab., Gothenburg (Sweden), 3p., 1974. Translated from Swedish.*

Field evaluations of the environmental impact of the Savenas Incineration plant were conducted from June 1973 to May 1974. Source measurements of the composition of the incoming waste material and the levels of gaseous and particulate emissions produced at the stack were performed along with dust sampling and precipitation studies in the vicinity of the plant. Dust samples were analyzed for 17 trace elements. Gaseous mercury determinations were performed at two sampling locations during May of 1974.

54723 **APTIC NO. 77125**

Hoshika, Yasuyuki, Satoshi Kadowaki, Ichiro Kojima, Kazumi Koike, and Kenji Yoshimoto

THE GAS CHROMATOGRAPHIC ANALYSIS OF THE SULFUR COMPOUNDS IN THE AMBIENT AIR NEAR A KP MILL AND THEIR EVALUATION. *(Kurafuto parupu kojo fukin ni okeru iou kagobutsu no gasu kuromatogurafu bunseki to sono hyoka). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 9(6):8. Nov. 1974.*

The sulfur compounds in the ambient air near a kraft pulp mill processing 640,000 tons materials/yr were analyzed by gas chromatography with a flame photometry detector. The air sample was first collected by a 1 liter bottle, and then concentrated on a precolumn by the direct cold trap method with liquid oxygen. The concentrated air sample was bled out into the GC column for the analysis. Two different GC columns were tested 25% tris 2-cyanoethoxy propane (TECP) and 25% tricresylphosphate. Six sulfur compounds could be identified including carbonyl sulfide, hydrogen sulfide, methyl mercaptan, sulfur dioxide, dimethyl sulfide, and dimethyl disulfide. The TECP column however did not separate sulfur dioxide and dimethyl sulfide well. The average concentrations found from the 16 analyses were 1.00 ppm H2S, 12.30 ppm methyl mercaptan, 8.50 ppm dimethyl sulfide, and 3.80 ppm dimethyl disulfide. A linear relationship between the logarithmic GC peak area and logarithmic concentration was observed in the calibration curves for 1 to 64 ng H2S, 1 to 32 ng methyl mercaptan, 1 to 64 ng dimethyl disulfide, and 1 to 89 ng dimethyl sulfide.

54724 **APTIC NO. 77077**

Hurter, Donald A.

A STUDY OF TECHNOLOGICAL IMPROVEMENTS IN AUTOMOBILE FUEL CONSUMPTION. VOLUME IIIB: APPENDIXES IV THROUGH VII (FINAL REPORT). *Little (Arthur D.), Inc., Cambridge, Mass., U. S. Dept. of Transportation Contract DOT-TSC-627, Work Unit 0S514/R5523, Rept. DOT-TSC-OST-74-40.IIIB, 445p., Dec. 1974. 380 refs.*

NTIS: PB 238 696

Results of a study to determine potential improvements in automobile fuel consumption based on innovative design and components are presented. Obvious technological innovations (e.g., power plants (such as spark-ignited, turbocharged, stratified charge, electronic fuel-injected, and diesel), transmissions and drive train systems, tires, accessories and auxiliaries, aerodynamics, and weight) that would save on fuel consumption were identified and evaluated. Operation of reference vehicles equipped with innovative components or redesigned was computer-simulated to predict fuel usage and performance. Techniques to measure fuel economy performance were also developed, and a statistical evaluation of published driving modes was performed. Compliance of innovative components with constraints (such as emissions and safety) and user requirements was determined. Optimized synthesized standard and compact-sized vehicles were simulated and total systems evaluation of each vehicle was performed on the basis of fuel usage, performance, technical compatibility, compliance with constraints, user acceptability and manufacturer adaptability.

54725 **APTIC NO. 79196**

Hurter, Donald A.

A STUDY OF TECHNOLOGICAL IMPROVEMENTS IN AUTOMOBILE FUEL CONSUMPTION. VOLUME I: EXECUTIVE SUMMARY (FINAL REPORT). *Little,* *(Arthur D.), Dept. of Transportation and Environmental Protection Agency Inc., Cambridge, Mass., Contract DOT-TSC-627, Work Unit OS514/R5523, Rept. DOT-TSC-OST-74-40.I, 44p., Dec. 1974.*

NTIS: PB 238 693

A study was conducted to determine potential improvements in automobile fuel consumption based on innovative design and components. Standard and compact size reference vehicles were selected, and a study of how power is used was conducted. Obvious technological innovations, including spark ignited, stratified charge, and lightweight diesel engines, catalytic converters, air-fuel ratio, transmissions and drive train systems, tires, accessories and auxiliaries, aerodynamics, and weight, that would save on fuel consumption were identified and evaluated, and then screened against program constraints. Operation of reference vehicles equippped with innovative components or redesigned was computer simulated to predict fuel usage and performance. Techniques to measure fuel economy performance were also developed, and a statistical evaluation of published driving modes was performed. Costs of fuel economy gains and lead time are discussed. Compliance of innovative components with constraints such as emissions and safety and user requirements was determined. Optimized synthesized standard and compact size vehicles were simulated, and total systems evaluation of each vehicle was performed on the basis of fuel usage, performance, technical compatibility, compliance with constraints, user acceptability, and manufacturer adaptability. Synthesized vehicles were ranked in accordance with study objectives, and conclusions and recommendations on designs were drawn. Program plans for synthesized vehicies were also selected. (Author abstract modified)

54726 **APTIC NO. 79043**

Kalmon, B. and F. A. Koehler

PORTSMOUTH GASEOUS DIFFUSION PLANT ENVIRONMENTAL MONITORING REPORT-1973. *Goodyear Atomic Corp., Piketon, Ohio, Atomic Energy Commission Contract AT-(33-2)-1, 27p., May 3, 1974. 5 refs.*

NTIS: GAT-781

Emissions measurements and ambient air monitoring data for the Portsmouth Gaseous Diffusion Plant are presented. The average environmental concentrations of alpha and beta activity at those locations where the averages were the highest were 0.63% and 0.08%, respectively, of the Atomic Energy Commission s Radioactivity Concentration Guides. The highest single ambient sulfur dioxide concentration was 15% of the Federal standard. Sulfur dioxide emissions from a steam plant burning low and high sulfur coal were 1 lb/million Btu input and 3 lb/million Btu input, respectively. Particulate matter emissions for low and high sulfur coal were 0.4 and 0.2 lb/million Btu input, respectively. Ambient fluoride concentrations in the vicinity of the plant reached a maximum of 5.1 ppb. The overall yearly average of fluoride concentrations in vegetation around the plant boundaries was 6.5 micrograms/g. With the exception of particulate matter, none of the emission levels or ambient concentrations exceeded applicable standards during 1973.

54727 **APTIC NO. 79531**

Kalusova, Lucie and Jindrich Bartonek

POSSIBILITY OF THE USE OF GAS CHROMATOGRAPHY WITH MODIFIED FLAME PHOTOMETRIC DETECTOR FOR THE DETERMINATION OF SULFUR EMISSIONS FROM PULP MILLS. *(Moznosti vyuziti plynove chromatografie ke stanoveni sirnych exhalatu v celulozkach pomoci modifikovaneho FPD). Text in Czech. Papir Celuloza, 29(11):260-262, Nov. 1974. 23 refs.*

The applicability of a flame-photometric detector, based on patent by Sevcik to analysis of sulfur emissions from a pulp mill was tested. The reason for these tests was the fact that the chromatographic detectors such as catharometer, flame ionization detector and microcoulometric detectors were inadequate for this application. A minimum detectable quantity of sulfur of 33 ppm has been measured with the flame-photometric detector under the following conditions of flow of the combustion agents: hydrogen - 50 ml/min, nitrogen - 36 ml/min, and air - 950 ml/min. The minimum detectable quantity decreased to 5 ppm when the conditions of flow were changed to: H2-100 ml/min, N2-36 ml/min, and air-250 ml/min. The ranges of sulfur content of various emissions, measured at three selected points in a pulp mill were as follows: 60-4710 for hydrogen sulfide, 30-1835 for methyl mercaptan, 32-159 for dimethyl sulfide and 43-126 for dimethyl sulfide. The sensitivity of the FPD is sufficient for its application to analysis of sulfur emissions from pulp mills.

54728 **APTIC NO. 79204**

Klaubert, Earl C. and Robert A. Walter

MARINE ENGINE-EXHAUST EMISSIONS TEST CELL (INTERIM REPORT). *Dept. of Transportation, Cambridge, Mass., Transportation Systems Center, Coast Guard Proj. 4330.3/5, Work Unit CG407/R4001, Rept. DOT-TSC-USCG-74-2, CG-D-27-75, 68p., Nov. 1974. 3 refs.*

NTIS, DDC: AD A001874

A marine engine-exhaust emissions test cell for boat-size diesel engines (approximately 200 horsepower) and outboard engines is described. The gas sample for analysis is drawn from the exhaust manifold of the outboard engine above the point at which water is introduced into the exhaust. The sample is carried through 20 ft of sample lines for further conditioning at an instrument cart located outside the test cell. The test set up employs non-dispersive infrared analysis of carbon monoxide and carbon dioxide measurements. Chemiluminescence is used for the detection of nitric oxide and nitric oxide and nitrogen oxides, while flame ionization is employed for measurements of total hydrocarbons. Permanent records of the outputs from the analytical instrumentation are produced by three strip-chart recorders.

54729 **APTIC NO. 75897**

Kuryvial, R. J., R. A. Wood, and R. E. Barrett

IDENTIFICATION AND ASSESSMENT OF ASBESTOS EMISSIONS FROM INCIDENTAL SOURCES OF ASBESTOS (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Environmental Protection Agency Contract 68-02-0230, Task 24, Program Element 1AB015, ROAP 21 AFA- 004, Rept. EPA-650/2-74-087, 342p., Sept. 1974. 237 refs.*

NTIS: PB 241999/AS

Mining operations that involve ore or gangue containing asbestos as an accessor mineral were identified and evaluated in terms of their health hazard. An extensive literature search yielded a catalog of all known and probable occurrences of asbestos in the United States, and these locations were screened to identify large mining activities which are capable of causing the release of asbestos to the atmosphere. There were 16 such sites identified. Emissions were estimated for each of these sites based on production figures and the nature of the operations. Further characterization based on probable emissions and population density considerations was performed for two of the 16 sites. Ambient air samples taken at the two sites revealed non-hazardous asbestos concentrations of 0.009 micrograms/cu m (maximum 24-hour concentration). The application of these findings to all possible sources is not valid, however, because of the limited sampling and analysis. (Author abstract modified)

54730 **APTIC NO. 79133**

Le Pera, Maurice E. and John G. Sonnenburg

FIRE-SAFE FUEL: FUEL PROPERTIES AND SYSTEM COMPATIBILITY STUDIES (INTERIM REPORT).

Army Mobility Equipment Research and Development Center, Aberdeen Proving Ground, Md., Coating and Chemical Lab., Army Proj. IT662611A106, AMCMS Code 662611.11.8000, Rept. 301231p., Feb. 1974. 6 refs.

A fuel additive containing 5% by volume of bromochloromethane designed to reduce fuel fire hazards was evaluated in terms of its effects on diesel fuel performance, its compatibility with elastomers, and its corrosion causing potential. The fuel additive alone and in combination with other additives produced significant changes in diesel fuel properties which in turn affect fuel atomization, spray formation, spray penetration, dispersion, and droplet size. The additive also showed the potential to degrade certain elastomers currently in use. Preliminary corrosion studies revealed that in the presence of trace water the additive reacts with various metals.

54731 **APTIC NO. 79030**

Leroux, Robert

AIR POLLUTION IN NON-INDUSTRIAL TOWNS AND HUMAN ECOLOGY IN THE CITY. (PART 2). *(La pollution de l air des villes non industrielles et ecologie humaine dans la cite). Text in French. Chaud Froid Plomberie, 28(335):63-66, March 1974. 23 refs.*

General ecological aspects of air pollution in non-industrial towns during smog-free periods are discussed. The destruction of tin roofs by sulfur dioxide and acetic acid generated by domestic heating equipment can be substantially reduced by painting. Ammonia and SO2 damage buildings made of calcarous materials, and walls are soiled by soot and fumes emitted by domestic heating. Air pollution generated by automobiles is localized in places of high traffic density, and is due primarily to carbon monoxide. Although green spaces within towns are inefficient regarding the removal of CO and polycyclic aromatic hydrocarbons, they do reduce the carbon dioxide and SO2 concentrations. Their purifying capacity is smallest during the winter when pollutant concentrations are highest. Apart from Staphylococcus and Streptococcus, there are practically no pathogenic germs in the air. Air pollution hazards in non-industrial towns are due primarily to indoor rather than outdoor air pollution.

54732 **APTIC NO. 79536**

Masek, Vaclav

TAR SUBSTANCES AND PYRIDINE GASES AROUND COKERIES. *(Dehtovite latky a pyridinove zasady v blizkem okoli koksoven). Text in Czech. Hutnicke Listy (Prague), 29(11):763-772, Nov. 1974. 10 refs.*

Measurements of tar and pyridine contents of fly ash have been conducted at distances up to 3200 m away from three different coking plants. The tar substances were extracted by benzene and the pyridine was extracted by a mixture of citric acid and methanol. Spectral analysis of obtained substances was performed in both cases. The results revealed that for wind velocities of 3.6-4.5 m/sec the emissions produced by normally operating cokeries create air pollution near the surface of the earth (height 1.5 m) which is significant only at distances of 250-500 m away from the plant. Tar substances are regarded as a good indicator of pollution because of their cancer-producing properties.

54733 **APTIC NO. 79462**

Matsumura, Ikutoshi

EVAPORATION LOSS OF HYDROCARBON IN HANDLING PETROLEUM. *Sekiyu Gakkai Hokoku (Bull. Japan Petroleum Inst.), 16(2):132-139, Nov. 1974. 7 refs.*

Evaporation losses of hydrocarbons at refineries, oil terminals, and gas stations throughout Japan were investigated during 1973. The breathing losses from a 5000-kiloliter cone roof tank were 580, 460, and 200 kg/day for light naphtha, gasoline, and crude oil, respectively. Filling losses from the same tank were 1.23, 1.00, and 0.52 kg/kl, respectively, for the above components. Breathing losses from a floating roof tank were 20,600, 2230, and 0 kg/yr for light naphtha, gasoline and crude oil, respectively. Withdrawing losses for gasoline and crude oil were 0.0016 and 0.00048 kg/kl, respectively. Losses occurring during the loading of a tanker were 0.34, 0.19, and 0.12 kg/kl for light naphtha, gasoline, and crude oil, respectively. Gasoline and light naphtha losses occurring during the loading of a tank truck were 0.89 and 2.49 kg/kl for gasoline and light naphtha, respectively. Underground tank losses at a gasoline station amounted to 1.08 kg/kl; those occurring during the filling of a vehicle were 1.44 kg/kl. Generally the hydrocarbon emission factors obtained during the study were smaller than those obtained during similar studies by the Environmental Protection Agency in the United States.

54734 **APTIC NO. 77163**

Mellor, A. M.

SPRAY COMBUSTION FROM AN AIR-ASSIST NOZZLE. *Combust. Sci. Technol., 9(3-4):165-169, 1974. 6 refs.*

Nitric oxide emissions from a spray flame generated by an air-assist nozzle are demonstrated to be consistent with a physical model previously developed for such flames with simplex, pressure-atomizing injectors. The mixing parameter of the Fletcher and Heywood gas turbine combustor model appears to be determined by injector characteristics rather than mixing phenomena for poorly atomized sprays. Liquid fuels containing bound nitrogen exhibit an optimum pressure drop across the injector for a minimum NO emission index. (Author abstract modified)

54735 **APTIC NO. 79094**

Miller, Terry L. and Pierre M. Sprey

A METHOD FOR DEVELOPING A POLLUTION ABATEMENT STRATEGY USING AIR QUALITY DATA. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 3, p 41-69. 8 refs.*

Air quality data analysis was used to develop a regional air quality management plan for the control of ambient levels of sulfur dioxide during the energy crisis in New England. Ambient SO2 measurements taken throughout New England during the previous two winters were analyzed. All 125 air monitoring stations were ranked according to SO2 concentration. Sulfur dioxide data from some of the worse stations were separated into eight categories, depending on the prevailing wind direction for that day, and normalized for wind speeds of 10 mi/hr. Normalized pollutant concentrations were plotted versus wind direction on a polar graph to indicate the relative apparent source strengths in each direction. The relative contributions of area and point sources were determined as a percentage of the measured pollutant level. The air quality stations were divided into three categories; critical air quality areas where ambient air quality standards were already being exceeded, intermediate air quality areas where air quality standards were being approached, and safe air quality areas where measured levels were well below standards. Sulfur dioxide standards can best be preserved by allowing necessary increases in SO2 emissions in the relatively safe air quality areas, not allowing any increase in SO2 emissions in critical air quality areas, and carefully controlling any increase in SO2 emissions in intermediate air quality areas. Allowable percentage emissions increases which will protect annual and daily SO2 standards are given for point sources. Temporary fuel switching is recommended to reduce emissions of SO2 during adverse meteorological conditions.

54736 **APTIC NO. 75913**

Nayzer, Yan and Vatslav Mashek

DETERMINATION OF PYRIDINE AND ITS HOMOLOGS IN THE AIR OF COKE PLANTS. *(Opredeleniye piridina i yego homologov y okruzhayushchey srede rabochikh koksovykh zavodov). Gigiena i Sanit., 39(5):76-78, May 1974. Translated from Russian, 4p.*

A method for the determination of pyridine and its homologs in the indoor atmosphere of coke plants is described. The method is based on the gas chromatographic separation of the compounds of interest. The absorber is filled with 50 ml of a 5% aqueous solution of citric acid and a 0.2% solution of butanol. The absorbed pyridine bases are isolated from the aqueous solution by using 10 ml of a 10% solution of potassium hydroxide, a Parnas-Bagner semi-microdistillation instrument, and a distillate collector with 10 ml of benzene. The benzene solution which is produced is dehydrated with solid sodium hydroxide or molecular sieves. Concentrations of pyridine and several of its homologs are tabulated for various sections of a coke plant.

54737 **APTIC NO. 79099**

O Connor, Anthony

THE PREVENTION OF POLLUTION FROM INDUSTRY. THE STEEL INDUSTRY. *Preprint, National Society for Clean Air, Brighton (England), 13p., 1974. (Presented at the National Society for Clean Air, Annual Conference, 41st, Cardiff, Wales, Oct. 14-18, 1974.)*

Sources of air pollution from various operations in the iron and steel industry are reviewed. Particulate emissions range from coarse grit and dust arising during coke and sinter production to finely divided fume associated with the use of oxygen in steel making. A modern basic oxygen steel plant produces a weight of iron oxide fume equal to nearly 1% of the steel produced, i.e., 500-600 tons/wk for a major steel plant. Gaseous emissions from iron and steel making operations include sulfur dioxide, carbon monoxide, carbon dioxide, nitrogen oxides, ammonia, hydrogen sulfide, and relatively small quantities of other volatile compounds such as hydrocarbons. Sulfur dioxide emissions arise mainly from the burning of fuels such as oil and coal and from the sintering of iron ore. The total SO2 emissions from a typical large integrated iron and steel works is likely to be several hundred tons/wk.

54738 **APTIC NO. 79163**

O Keefe, Lawrence P.

MODELING INCINERATOR FLUE TRAIN PERFORMANCE WITH A DIGITAL COMPUTER. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla., 1974, p. 173-178. 2 refs. (May 12-15.)*

A mathematical model which characterizes incinerator flue gas in terms of temperature, weight and volume flow, moisture content, pressure drop, and particulate content as it travels from the grate bed to the stack is described. Furnace and flue train design data are fed into the model along with refuse composition and forced draft air flow rates, and a computer provides printouts of flue gas conditions at each point in the flue train for each combination of refuse composition and air flow. The contaminant loading section of the model uses an empirical equation to calculate the weight of fly ash generated. Each contaminant removal process is assigned its own removal efficiency value or equation, and the amount of contaminant remaining is calculated at these points. An electrostatic precipitator subroutine calculates the particulate contained in the flue gas exiting to the atmosphere as a function of inlet dust loading and gas velocity. Energy recovery processes can be modeled by adding a waste heat boiler subroutine or, in the case of a waterwalled furnace, adding equations to the furnace subroutine. The model is useful for understanding the range of conditions during operation and for designing the incinerator and control equipment for minimum pollutant generation. (Author abstract modified)

54739 **APTIC NO. 79038**

Rainwater, Frank H.

REPORT TO THE COMMITTEE ON ELECTRIC POWER ON ENVIRONMENTAL CONSEQUENCES SPRAY COOLING SYSTEMS. *Preprint, United Nations, Zurich (Switzerland), Committee on Electric Power, 10p., 1974. (Presented at the Environmental Aspects of the Cooling Systems of Thermal Power Stations Seminar, Zurich, Switzerland, May 13-16, 1974.)*

The environmental consequences of spray cooling modules for thermal power stations are discussed. No chemical additives to the circulating water are required by spray equipment; thus, possible air or water pollution by such devices is not a problem. Vapor fog and ice resulting from spray cooling can be a problem, however. Observable amounts of fog continued to be produced by one spray installation 10-15 min after natural fog lifted. Rime ice deposits at 150 ft or more from spray installations were also observed. Data on drift indicate that one module with a 10 mi/hr wind deposits 0.002 ga/day/sq ft at a distance of 100 ft from the spray. Regarding evaporative water loss, 80-90% of the cooling is accomplished by evaporation under summer operating conditions.

54740 **APTIC NO. 79308**

zz Reed, Stuart B.

POLLUTION -- PHYSICAL AND MENTAL. (A) PHYSICAL POLLUTION: AN ENVIRONMENTAL STITCH IN TIME AND ECOLOGY CENTRES. *Roy. Soc. Health J. (London), 94(6):278-282, Dec. 1974. 12 refs.*

Courses of action against air pollution in the United Kingdom are discussed. Local environmental centers where individuals can centralize their queries concerning the environment are recommended. The inclusion of an environmental quality standard as one of the design criteria for a product, a process, or a construction scheme is likely to minimize the cost of achieving a given pollution level. A number of pollution problems are considered where this principle may well apply, or which illustrate the difficulties arising from the lack of appropriate standards. These include wind turbulence and noise as well as air pollution. The most significant aspect of indoor pollution is the limited amount of air available for diluting any pollutant released into the home atmosphere. Aerosol spray propellents are generally halogenated hydrocarbons which can decompose into other potentially harmful substances on radiators and in gas fired appliances. The main source of indoor air pollution is probably the combustion products from unflued gas appliances. The combustion products contain water vapor, carbon dioxide, carbon monoxide, oxides of nitrogen, and trace quantities of aldehydes and hydrocarbons. There is uncertainty as to the possible health effects of pollution in the home, especially since the very young, the old, and the chronically sick may spend nearly all of their time there. Ventilation with air from outside introduces the risk that carbon monoxide and oxides of nitrogen from vehicle exhausts could be added to air in the house already containing significant quantities of these pollutants.

54741 **APTIC NO. 77236**

Suzuki, R., M. Ito, M. Noma, A Moritani, Y. Watanabe, T. Nakaya, and N. Saito

DETERMINATION OF PCB IN DUST, ASH AND COMBUSTION GAS FROM CITY WASTES INCINERATORS. *(Toshigomi shokyakuro kara haishutsu sareru dasuto, haibun oyobi haigasu chu no PCB bunseki). Text in Japanese. Aichi-ken Kogai Chosa Senta Shoho (Rept. Environ. Pollut. Res. Cent. Aichi Pref.), no. 2:43-49, 1974. 9 refs.*

Polychlorobiphenyl (PCB) contents in combustion residue, water washed ash, dust collected with multicorn or electrostatic precipitator, and combustion gas were measured at four refuse incinerators in Aichi. For the combustion gas sampling, the wet method in which PCB is absorbed in n-hexane, the dry method using 5% glycerine coated florigil as adsorbent, and the two- shaped cylindrical glass filter method were used. The PCB in combustion residue, ash and dust was extracted with n-hexane after heating with postassium hydroxide-ethanol solution, purified by silica gel column, and determined by gas chromatography. The PCB contents were 0.02-0.15 microgram/g for combustion residue, 0.11 microgram/g for multicorn dust, 0.3i0.5 microgram/g for cottrel dust and 0.32-1.35 microgram/N cu m in combustion gas. The amount of PCB emitted from the incinerator varied in the range of 0.11-2.75 g/day, and the average was 1.1 g/ day.

54742 **APTIC NO. 77155**

Suzuki, Yukio, Yasuo Suzuki, Nobuo Fujii, and Takaji Mouri

ENVIRONMENTAL CONTAMINATION AROUND A SMELTERY BY ARSENIC. *(Bo seiren kojo shuhen no hiso ni yoru osen kankyo). Text in Japanese. Shikoku Igaku Zasshi (Shikoku Acta Medica), 30(3):213-218, June 1974. 23 refs.*

Environmental contamination around a smelter was investigated by analyzing soil samples and hair samples from schoolchildren living in the area. Arsenic, nickel, and copper levels were above normal in soil samples taken near the factory; the levels decreased with increasing distance from the factory. The elevations of each element were significantly correlated with each other, suggesting their origin to be the factory. Arsenic levels in hair ranged from 0.05-12 micrograms/cu g and showed a log-normal distribution. The geometric mean was 1.87 micrograms/g, i.e., about nine times higher than the control level.

54743 **APTIC NO. 76917**

Uchiyama, M., Y. Shimada, I. Takahashi, Y. Saito, and F. Hayashi

STUDIES ON THE PHOTOCHEMICAL AIR POLLUTION: HALOGEN GAS IN THE AUTOMOBILE EXHAUST GAS. *(Kokagaku taiki osen ni kansuru kosatsu; jidosha haigasu chu no harogen gasu). Text in Japanese. Gunma-ken Kogai Kenkyu Senta Nenpo (Annu. Rep. Gunma Prefect. Res. Center Environ. Sci.), no. 6:134, Nov. 1974.*

The halogen gases in automobile exhaust gas were determined. The exhaust gas of regular gasoline engines was trapped with distilled water, and the sample water was oxidized using hot potassium permanganate and bromide was then extracted into carbon tetrachloride. The chloride and extracted bromide were separately determined by colorimetry. The average chloride and bromide levels found in the exhaust gases during idling were 0.94 ppm as hydrogen chloride and 0.35 ppm as hydrogen bromide respectively. However, the range of levels found varied greatly depending upon the engine tested. The chloride level ranged from 0.12 ppm to 2.16 ppm, and the bromide level ranged from 0.19 ppm to 0.75 ppm. The average of total chloride level plus bromide level was 1.16 ppm. The chloride and bromide levels at a parking lot were also determined, and the average chloride level and bromide level found were 0.08 ppm as HCl and 0.12 ppm as HBr respectively. Since no preliminary filter was used before trapping the exhaust gas components into the water trap, the analytical values of chloride and bromide determinations may have included the contribution of lead halogen compounds.

54744 **APTIC NO. 77027**

Yoshida, Takashi

UNEXPECTED EFFECTS OF LEAD-FREE GASOLINE: DEPOSITS AND EXHAUST GASES. *(Muen gasorin no igai na eikyo: Taisekibutsu to haishutsu gasu). Text in Japanese. Jidosha Kogaku (Automob. Eng.), 24(9):34-41, Sept. 1974.*

The effects of using leaded an unleaded gasoline on the formation of deposits in automobile combustion chambers are discussed. Effects of these deposits on exhaust emissions are described. Gasoline compositions are listed. Spark plug deposits, from using leaded or unleaded gasoline, were examined, after running the engine for 10,000 km. The density of deposit from leaded gasoline (white) was 2.33 g/ml; from unleaded (black), 0.88 g/ml. Unleaded gasoline causes softer deposits to form in the combustion chamber, and friction in the engine parts is reduced. Other factors involved in the formation of combustion chamber deposits are: structure and status of engine; engine load; heavy traffic conditions; exhaust gas recirculation (EGR) systems; ignition timing; air/fuel ratios required by the engine. As combustion chamber deposits increase, the octane value required by automobiles increases. For leaded gasoline, octane values reach an equilibrium value, but octane values for unleaded gasoline increase continuously. A sharp increase in the amount of blowby gas occurs when more than 1.5 g/gallon of lead is added to the gasoline, and piston ring deterioration occurs concurrently. No relationships have been determined between combustion chamber deposits and emission concentrations of nitrogen oxides. Results of emission tests conducted by the Ford Motor Co. on a test course (7-mode) and city streets for 18,000 miles, using leaded and unleaded gasoline are included.

54745 **APTIC NO. 75902**

Zoller, John M. and Donald J. Henz

NATIONAL AIR DATA BRANCH EMISSION DATA SYSTEMS TRAINING MANUAL (FINAL REPORT). *PEDCo-Environmental Specialists, Cincinnati, Ohio, Office of Air and Waste Management Contract 68-02-1375, Task 14, Rept. EPA-450/3-75-057, 146p., Aug. 1974. 12 refs.*

A training manual for the National Air Data Branch's computerized emission data systems is presented. Emphasis is placed on National Emission Data System point source data coding, updating procedures, and error messages produced by the edit/check program. Also covered are NEDS area source data development and coding. Various NEDS output formats are discussed along with the retrieval options available for each format. An introductory explanation of the Emissions Inventory Subsystem of the Comprehensive Data Handling System is provided, followed by instructions in coding point source data on EIS forms. (Author abstract modified)

54746 **APTIC NO. 77201**

Kyoto City Inst. Public Health

ANNUAL REPORT ON AIR POLLUTION. *(Nendonai Jisseki). Text in Japanese. Kyoto shi Eisei Kenkyusho Eiken Nenpo (Annu. Rept. Kyoto City Inst. Public Health), no. 40:81-93, Oct. 1974.*

Tests carried out by the Kyoto Municipal Public Health Research Institute from January 1973 to March 1974 are described. Sulfuric acid gas in the atmosphere was measured by the lead peroxide candle method, dust was measured by deposit gauge, and aerosols were measured by low-volume air sampler in order to correct the errors in measurement made by automatic gauge. Metals in the atmosphere were measured by low-volume air sampler. Experiments and surveys were done to determine air pollutants produced by photochemical reactions. Studies concerning the decrease in carbon monoxide in the atmosphere were done. A survey was made of nitrogen oxides in stack gases. The sulfur content in heavy oil was measured. Studies on the elimination of harmful gases generated by organic solvents were done. The concentration of sulfur oxides in boiler smoke was measured. Gases, particulates and odors were measured following complaints from citizens. Maintenance and control of automatic gauges installed at air pollution and exhaust gas monitoring stations were examined. In Kyoto City, 5 locations were chosen in 1964 to monitor sulfuric acid gas pollution. Although they were sufficient to follow the trend (with 1968-1969 as the peak). the emissions gradually decreased. In 1973, there was a 17% decrease from the preceding year. In 1973, measurements were made at 33 locations, and the lowest concentrations for both industrial and residential areas were recorded in September (average 0.35 mg sulfur trioxides/day/sq cm lead dioxide). The highest concentration was 0.5 in February 1973.

54747 **APTIC NO. 79103**

Council on Environmental Quality

AIR POLLUTION. *In: OCS Oil and Gas -- An Environmental Assessment, p. 8-28 - 8-34, April 1974.*

Air quality in the Northern Washington Air Quality Control Region is currently in compliance with primary standards. Air quality in the Puget Sound Intrastate AQCR is significantly worse than the Northern Washington Intrastate AQCR, and is assigned an air quality priority classification of I by the Environmental Protection Agency for all pollutants under consideration. The major emissions sources in both areas are industrial process losses in the primary metal, mineral products, and petroleum industries. The air pollution loading impacts for the Skagit/Whatcom County locality and for the Puget Sound region overall are virtually identical for all of the pollutants, about 10 to 15% over base case development in the locality and about 2% for the region overall. The only pollutant appearing to pose possible concentration problems in the future is particulates, where the total loadings are expected to increase by the yr 2000 due mainly to primary metal industry process losses. Although the impact loadings from offshore production are very slight for the region overall, the base case loadings expected could produce unacceptable air concentration levels for particulates and sulfur oxides at certain sites within the region. Due to the varying terrain and isolated population centers, a specific dispersion analysis must be carried out for the Washington area to identify specific locations where pollutant concentrations could exceed standards.

54748 **APTIC NO. 79105**

Council on Environmental Quality

AIR POLLUTION. *In: OCS Oil and Gas -- An Environmental Assessment, p. 3-31 - 3-37, April 1974.*

Air quality within Bristol County and Eastern Massachusetts is somewhat uneven. Ambient air concentrations in both Bristol County and Suffolk County presently exceed the primary particulate and sulfur oxides standards. Approximately 40% of the SOx emissions are from fossil fuel combustion for electricity and another 35% from commercial fuel combustion. Almost 60% of all nitrogen oxide emissions are from fuel combustion with the balance accounted for by transportation sources. Transportation sources account for over 70% of the hydrocarbon emissions and 97% of carbon monoxide emissions. The air pollution impact in Bristol County under high outer continental shelf conditions is most significant for hydrocarbons, resulting in loadings that would be approximately 6 times as great as the hydrocarbon loadings without offshore production. The major source of this pollutant is refineries, which could contribute as much as 90% of the additional hydrocarbons and cause severe air quality changes in the area immediately surrounding them. Current hydrocarbon and CO loadings are projected to decline significantly without OCS induced development, due to better emission controls in mobile sources. Particulates, sulfur oxide, and nitrogen oxides will decline slightly without OCS development as a result of new control technology. Even with high impact development in the yr 2000, particulates and NOx should only increase slightly over 1972 levels. Due to projected emission controls on mobile sources, hydrocarbons and CO should decrease significantly from the 1972 emission levels in Eastern Massachusetts, even under the high impact conditions.

54749 **APTIC NO. 79303**

Tokyo Metropolitan Government (Japan)

STENOGRAPHIC RECORDS OF THE COMMITTEE ON ENVIRONMENTAL PROTECTION AND CAPITAL CITY DEVELOPMENT. NO. 50. *(Kogai Shuto Seibi Iinkai Sokkiroku, Dai-50 go). Text in Japanese. 8p., Dec. 17, 1974.*

Proceedings were recorded of a meeting in which pollution matters affecting Metropolitan Tokyo were discussed. Testimony was given by members of the Pollution Bureau. Soil pollution by hexavalent chromium in a Tokyo ward was discussed. The area, at one time the property of Nippon Chemical Industrial Co., had been used as a waste dump from the manufacture of sodium dichromate. Maximum total chromium concentration of 47,000 ppm, and maximum hexavalent chromium concentration of 26,000 ppm were found in the soil. Some 40,000 tons of soil chunks containing hexavalent chromium are estimated to be present, and another 60,000 tons of soil have been affected by seepage. Subterranean water has carried chromium upward, but there seems to be no downward movement so far. At the time of the survey in 1973, health problems were not reported by the residents, although chromium in water and airborne dust was present. Decontamination or isolation of the polluted area is under consideration. Water contamination by major Tokyo printing firms was discussed. The Pollution Bureau complained that although these businesses had been cited repeatedly, compliance had not occurred. The Committee wondered why the Pollution Bureau was unaware that a printing concern, employing 550 persons, with capital of $1.7 million had a building wing spewing forth copper, iron, chromium, and hexavalent chromium pollutants, which had escaped registration and inspection for so long. Noise (about 100 phons), odor, and emission complaints about an automobile junkyard and an automobile repair factory were discussed. Erection of sound barriers or relocation of the businesses away from the residential areas have been urged as possible solutions. Another Tokyo ward complained of river pollution in their area from upstream factories (especially veneer) located in Saitama Prefecture. Cooperative efforts between Saitama and Tokyo authorities are under way to control this pollution. Exhaust gas, noise and vibration complaints from residents near a bypass were discussed. Pollution monitoring and surveys are being conducted.

54750 **APTIC NO. 79486**

Japan Automobile Industrial Assoc.

AIR POLLUTION ORIGINATING IN ROAD TRAFFIC: RESEARCH AIMS AND PROGRESS. *(Doro kotsu ni kiin suru taiki osen: Kenkyu no mokuteki to keika). Text in Japanese. In: Fundamental Research Rep. on Road Traffic Pollution, 70p., 1974. 2 refs.*

A road traffic pollution survey was conducted continuously for 72 hours in November 1973, in an area including both sides of a highway (not at an intersection) in Tokyo. Data measured included traffic flow (amount of traffic; speed; number of vehicles); pollutants (carbon monoxide; nitric oxide; nitrogen oxides without NO; total hydrocarbons (THC)); and, meteorological conditions (wind direction; wind velocity; temperature; humidity; amount of ultraviolet radiation; weather). Amount of traffic varied from 135-1165 vehicles/15 min (average, 733.5). Speeds ranged from 15.2-65.4 km/hr (average, 53.56). Number of vehicles ranged from 0.4-13.8 vehicles/50 m (average, 3.05). Large and small freight trucks made up 31% of the vehicles; the remainder were passenger vehicles, including taxis and buses. Pollutant concentration averages were as follows: CO, 1.0-18.0 ppm (average 6.5); NO, 6.1-80.6 pphm (average 29.5); NOx, 0.5-5.6 pphm (average 2.8); THC, 2.3-6.7 ppm C (average 4.1). There was a very strong correlation between traffic flow and concentrations of CO, NO, and to a lesser extent, THC. Variations in wind velocity also affected CO, NO, and THC concentrations. Concentrations of NOx were not affected by amount of traffic or wind velocity. A peak in NOx occurred around 12 noon. Pollution by CO, NO, and THC is assumed to be localized, while pollution by NOx is more widespread, and has a different mechanism. Some empirical equations were formulated for predicting concentrations of CO, NO, and THC.

1973

54751 **APTIC NO. 79518**

Alcock, Keith

WRITTEN COMMENTS SUBMITTED AFTER THE SYMPOSIUM. *Dept. of the Interior, Washington, D. C., Bureau of Mines, Use Diesel-Powered Equip. Underground Min. Symp. Proc., Pittsburgh, Pa., 1973, p. 359-363. (Jan. 30-31.)*

Diesel engines used in coal mines are considered as an emissions source. Carbon monoxide and nitrogen oxides are both present in the exhaust of these engines. Scrubbers, water injection, and alternative engines are among the control methods considered. Requirements for flameproofing diesel engines used in British coal mines are discussed. The mine atmosphere should be monitored regularly for excessive concentrations of diesel exhaust emissions. British regulations call for weekly sampling in diesel haulage roadways and 3 mo sampling of the neat exhaust gas of each diesel unit. Poor maintenance of the diesel engine itself leads to restricted air inlet, incomplete combustion, and increased back pressure through buildup of particulate matter in the exhaust scrubber. All these malfunctions will result in a rapid increase of concentration of CO, aldehydes, and smoke, but not NOx, in the exhaust. Lack of maintenance shows up in the form of objectionable fumes before there is any increase in hazard. Should continuous monitoring be considered necessary, ventilating current is the most important parameter. Noise pollution is also discussed.

54752 **APTIC NO. 79096**

Harrison, Paul R.

AIR POLLUTION BY LEAD AND OTHER TRACE METALS. *Adv. Exp. Med. Biol., 40(7-8):173-237, 1973. 24 refs.*

An overview is given of the sources of lead and some other trace metals, both manmade and natural; their ambient levels found in some populated regions; and their transport, fallout, and rainout into the surface biosphere. The possibility of a secondary emission of reflotation is also discussed. Finally, a brief discussion of the effects on vegetation, bacteria, and animals is presented. (Author abstract modified)

54753 **APTIC NO. 79515**

Masek, V.

A CONTRIBUTION TO THE QUALITIES OF FLYING SOLID EMISSIONS ON A PITCH COKING PLANT. *(Prispevek k vlastnostem poletavych tuhych emisi ve smolne koksovne). Text in Czech. Cesk. Hyg., 18(5):227-234, 1973. 12 refs.*

Three samples of airborne dust are analyzed for size and composition, disperity of the particles, and specific surface. The appearance of the smallest particles was examined by electron microscope. The current potential; contact catalytic effect on the decomposition of hydrogen peroxide; sorption qualities in the original, hydrolyzed, and aged condition; efficiency of adsorption of carbon dioxide, acetone vapors, and carbon tetrachloride; the extent of release and absorption of nutrients by cultivated plants; and the effect of the inversion of saccharose by invertase and radioactivity were examined. All the physicochemical methods used indicated that the dust examined was not highly reactive. (Author abstract)

54754 **APTIC NO. 79007**

Medvedev, V. A., L. R. Stupa, and L. F. Vasyutin

PHOTOCOLORIMETRIC DETERMINATION OF 1,4-NAPHTHOQUINONE WITH INDENE IN BENZENE. *Coke Chem. USSR (English translation from Russian of: Koks i Khim.), no. 1:39-41, 1973. 12 refs.*

A colorimetric procedure for the determination of 1,4-naphthoquinone in benzene is described. The analysis is useful in monitoring the purification of scrubber liquor resulting from the treatment of toxic waste gases formed during the production of phthalic anhydride by the catalytic vapor-phase oxidation of naphthalene. The method is based on the formation of colored fulvenes which occurs as a result of the condensation of quinones with indene in alkaline media. The optical density of the solution varies linearly with its concentration in the range of 0.01-0.06 mg/l of 1,4-naphthoquinone. The relative error of the determination is + or - 3.7%.

54755 **APTIC NO. 79013**

Neiser, Jan, Miroslav Kaloc, and Vaclav Masek

PYRIDINE AND ITS HOMOLOGUES IN THE ATMOSPHERE OF COKE OVEN PLANTS. *(Pyridin a jeho homology v ovzdusi pracovist koksoven). Text in Czech. Sh. Ved. Pr. Vys. Sk. Banske Ostrave, 19(1):287-309, 1973. 38 refs.*

Coke oven plant atmospheres were analyzed for pyridine and its homologues via spectrophotometry and gas chromatography. Concentrations of pyridine bases ranged from 300-9250 micrograms/cu m. The sampling method involved passing 250-300 liter of air through two consecutive gas washers containing glass filters and 0.1 N sulfuric acid. An absorption of 99% was achieved. The spectrophotometric determination involved the measurement of light absorption at 573 nm for pyridine compounds in a solution of Chloramine T, potassium cyanide, and barbituric acid. The chromatographic determination was performed at a temperature of 130 C in a 300 by 0.4 cm column filled with Chromaton K impregnated with 4.2% Carbowax 1500 and 1.6% potassium hydroxide in an argon stream. Flame ionization detection was used.

54756 **APTIC NO. 79114**

Shigehara, Roger T., Roy M. Neulicht, and Walter S. Smith

A METHOD FOR CALCULATING POWER PLANT EMISSION RATES. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., and Entropy Environmentalist, Inc., Research Triangle Park, N. C., 11p., 1973 (?). 12 refs.*

A method for calculating power plant emission rates in terms of lb/million Btu heat input is described that eliminates the need for measuring effluent volumetric flow rate and heat input rate. The pollutant emissions can be calculated when only pollutant concentration, oxygen concentration, and fuel type are known. The method involves calculating a constant (F factor) based on the relationship between the fuel heat value and dry effluent. Inconsistencies that arise in measuring the heat input rate are thus eliminated, while the error propagated from the F factor to the pollutant emission rate is at most 3%. Measurements of effluent volumetric flow rate and heat input rate can be used to compute a measured F factor which can then be compared with the calculated F factor as a mass balance check.

1972

54757 **APTIC NO. 79021**

Roberts, Fred S.

BUILDING AN ENERGY DEMAND SIGNED DIGRAPH I: CHOOSING THE NODES. *Rand Corp., Santa Monica, Calif., National Science Foundation Grant GI-44, Rept. NSF-RA-N-72-056, R-927/1-NSF, 47p., April 1972. 20 refs.*

NTIS: PB 236274

A method for choosing the nodes for an energy demand signed digraph using the subjective judgments of groups of experts is described and applied to the intraregional commuter transportation sector. The procedure consists of two rounds. The first round involves the gathering of a large list of relevant variables via free response questionnaires circulated among the experts. The variables are then classified and organized, and the second round attempts to limit their number by having the experts rate overall and relative importance. The method is applied to automobile, bus, and rail modes of transportation. Variables selected in the example include: the cost of reducing hydrocarbon, carbon monoxide, carbon dioxide, nitrogen oxide, particulate, and odorous emissions to acceptable levels; emission levels and factors for each transportation mode; damage to human health and crops associated with each transportation mode; and the impact of each transportation mode on visibility (smog production).

1970

54758 **APTIC NO. 79019**

Fimreite, Norvald

MERCURY USES IN CANADA AND THEIR POSSIBLE HAZARDS AS SOURCES OF MERCURY CONTAMINATION. *Environ. Pollut., no. 1:119-131, 1970. 38 refs.*

Industrial uses of mercury in Canada are reviewed along with their possible hazards as sources of air and water contamination. The major industrial user of mercury is the Chlor-alkali industry which releases nearly 200,000 lb of the metal into the environment each year. Most of the mercury is released into streams and lakes, although traces of the metal (20-30 mg/cu m) are released to the atmosphere with hydrogen gas. Another source of mercury contamination is commercial paint production. The mercury content of commercial paint is about 0.05%, and the toxic compounds are somewhat volatile and capable of polluting the air. Mercury is also released to the air during the burning of coal and other fuels containing traces of the metal. The accumulation of mercury in soils caused by the use of mercury-containing seed coatings appears to be comparable with that resulting from precipitation.

CONTROL METHODS

1975

54759 **APTIC NO. 79497**

Aharoni, Chaim, Mark Neuman, and Amos Notea

ADSORPTION OF LEAD CHLORIDE VAPORS. *Ind. Eng. Chem., 14(4): 417-421, Oct. 1975. 5 refs.*

Vapors of lead chloride flowed through a bed of alumina at temperatures between 570 and 650 C. Flows of lead chlorides of 0.2 to 2.3 g/hr on an adsorbent bed of about 18 cu cm at pressures well below condensation were used. The concentration of adsorbed lead was measured directly during the adsorption process by low energy gamma radiation and distribution curves were obtained. The rate of adsorption increases with the flow rate. The amount adsorbed at saturation depends on the internal surface area of the adsorbent as well as on the particle size. It does not depend on the concentration of lead in the gas phase. (Author abstract modified)

54760 **APTIC NO. 76960**

Amano, Masuo, Kazuo Shinoda, Haruo Watanabe, and Sadahiro Kimura

EXHAUST GAS CHARACTERISTICS OF FUEL INJECTION ENGINES. *(Nenryo funsha kikan no haiki tokusei ni tsuite). Text in Japanese. Preprint, Japan Society of Automotive Engineers, p. 39-46, 1975. 10 refs. (Presented at the Japan Society of Automotive Engineers, Science Lecture Meeting, Tokyo, Japan, May 13-15, 1975.)*

Fuel injection versus conventional carburetion was investigated in relation to the emission of nitrogen oxides from automobile exhaust. Fuel distribution was not the cause of reduced NOx emissions with fuel injection since little difference was found between each system regarding the distribution of the mixed gas. The temperature of the gas in the inhaling manifold was lower with fuel injection, and the low NOx discharge from fuel injected engines was attributable to this. Analysis of the pressure diagram indicated that combustion in the fuel injected engine was slower than that in the carburetor-equipped engine, on the dilute mixed gas side. At a definite time of injection, the NOx discharge rapidly decreased. This decrease was attributable to the inhaling of the injected fuel into the cylinder without evaporation. This direct inhaling of the fuel is possibly the cause of various characteristic behaviors of fuel injected engines. An engine with a compression ratio of 9.1 was used for the study, and the capacity of the engine was 1968 cc.

54761 **APTIC NO. 79211**

Anderson, R. P. and C. H. Wright

COAL DESULFURIZATION IN THE P AND M SOLVENT REFINING PROCESS. *Preprint, Pittsburg and Midway Coal Mining Co., Merriam, Kans., 24p., 1975. 9 refs. (Presented at the American Chemical Society, Division of Fuel Chemistry, Spring Meeting, Philadelphia, Pa., April 6-11, 1975.)*

Coal is dissolved under moderate hydrogen pressure in an internally generated heavy aromatic solvent to produce a liquid from which mineral matter is removed by filtration. Solvent is recovered from the filtrate by vacuum distillation; the distillation residue, which can be handled in either liquid of solid form, is a very low ash, low sulfur material known as Solvent Refined Coal. Studies of variables affecting the degree of desulfurization were carried out in a laboratory scale continuous reactor which was modified to include up to three reaction vessels in order to accomplish variable temperature profiles. A preferred temperature profile is an initial high temperature followed by a lower temperature which allows a higher level of hydrogenation of the recycle solvent. Addition of a second dissolver vessel operated at a lower temperature than the preheater and the first dissolver improved desulfurization and hydrogen transfer capacity of the recycle solvent and increased solvent recovery. A sulfur elemental balance to determine the fate of sulfur in the feed coal is included. Coal concentrations up to 40% in the feed slurry have been used without difficulty. Solvent Refined Coal Products with sulfur levels as low as 0.52% have been obtained. (Author abstract modified)

54762 **APTIC NO. 77101**

Andrews, John W., Pierre Bonnifay, Bernard J. Cha, Yves Barthel, Andre Deschamps, Sigismund Frankowiak, and Phillipe Renault

CONTROL OF CLAUS PLANT SULFUR COMPOUND EMISSIONS WITH IFP TECHNOLOGY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-48.3.)*

A process for reducing emissions of sulfur compounds from Claus units is described. The process is an extension of the Claus reaction itself in the liquid phase. Mixed hydrogen sulfide and sulfur dioxide in tail gas from Claus units is fed to a packed tower in which a solution of proprietary catalyst in a high boiling point polyglycol circulates countercurrent to the gas flow. The mixed gases react with the catalyst to form a complex which in turn reacts with more gases to produce elemental sulfur. The reaction temperature keeps the sulfur above its melting point. Product accumulates in the boot of the tower and is drawn off continuously through a seal leg. The process requires the least capital investment and has the lowest operating costs of all processes used to bring effluent sulfur values down to 1000 ppm SO2 after incineration. (Author abstract modified)

54763 **APTIC NO. 79387**

Antropov, B. V., A. M. Mironov, M. G. Krutskikh, and Z. M. Rubtsova

DETOXIFICATION OF GASEOUS EMISSIONS GENERATED IN PVC FOIL PRODUCTION. *(Obezvrezhivanie gazovykh vybrosov pri proizvodstve PVC-plenki). Text in Russian. Plast. Massy, no. 5:29-30, 1975. 6 refs.*

A laboratory foam absorber for the separation of diethylene glycol aerosol, the major air pollutant generated during the granulation and extrusion operations in polyvinyl chloride foil manufacture, and mathematical optimization of the absorption process are described. The actual diethylene glycol concentrations measured were between 5 and 100 mg/cu m, against a methyl allyl chloride value of 0.2 mg/cu m. The process of diethylene glycol separation was optimized with respect to the diethylene glycol concentration in the air-gas mixture, in the absorbent liquid, to the gas flow velocity through the free cross-section of the foam absorber column, and to the volume ratio of gas to liquid.

54764 **APTIC NO. 79302**

Araki, K., M. Mikami, and J. Honda

DEODORIZATION BY ZEOLITE TUFF. *(Gan fusseki gyokai-gan ni yoru gasu shu no akushu jyoko). Text in Japanese. Kogai (Hakua Shobo) (Pollution Control), 10(4):49-57, July 1975.*

Deodorization by catalytic oxidation using zeolite tuff as a catalyst was tested using a gaseous mixture consisting of air, hydrogen, and malodorants and effluent gas from a fish meal dryer. Descriptions of the chemical composition of the catalyst and experimental apparatus and procedure are given. The decomposition rates measured were compared with results obtained by using catalyst beds packed with glass beads. All malodorants except ammonia were decomposed almost completely over a temperature range of 250-350 C. Ammonia was adsorbed by up to 60% of the base exchange capacity of zeolite tuff and partially converted to trimethylamine. The decomposition rates measured were 97% (250 C) and 100% (300 C) for butyric acid, 93% (250 C), 99% (300 C), and 100% (350 C) for propionic acid, 88% (250 C), 96% (300 C), and 100% (350 C) for acetic acid, 100% (300 C) for methyl mercaptan, 85% (250 C) and 100% (300 C) for hydrogen sulfide, and 100% (350 C) for trimethylamine. A deodorization system (5 N cu m/min) for effluent gas from a fish meal dryer containing NH3 (22-346 ppm), amines (4.0-111 ppm), H2S(0.3-1.1 ppm), and mercaptans (1.0-4.2 ppm) was developed and tested. The deodorization system consists of a water scrubbing tower (removal of NH3 and amines), demister, and a deodorization tower. In the temperature range of 265-395 C, amines, NH3, H2S and mercaptans were removed almost completely.

54765 **APTIC NO. 76991**

Arrandale, Roy S.

POLLUTION CONTROL IN FUEL-FIRED TANKS. *Glass Ind., 56(6):12-13, June 1975. 10 refs.*

Experience with the use of a wet scrubber for removing submicron particles from glass furnace stack gases is reviewed. A scrubber made of ordinary mild steel was in operation on a flint-amber bottle tank for 14 yr, with its useful life being twice that expected. A preheater was employed to drop the effluent gas to a scrubbing temperature of about 300-400 F. Combustion air was preheated to about 500-650 F before entering the furnace checker. The preheater surface was cleaned continuously by a high pressure air blast nozzle which oscillated across the face of the exchange surface. An air-sand blast nozzle was also successfully used, although nothing was able to cope with dew point conditions. The preheater was maintained in equilibrium only by by-passing a part of the gas around it and/or blowing a control air stream through it. Plugging occurred gradually over a period of several months, necessitating its removal from operation for cleaning.

54766 **APTIC NO. 77140**

Atsugawa, M.

OPERATING DATA ON A WET-TYPE 2000 N CU M PER HOUR PLANT. *(Shisshiki 2000 N cu m/h kado data). Text in Japanese. Netsu Kanri to Kogai (Heat Management Public Nuisance), 27(2):43-45, Feb. 1975. 40 ABSTRACT*

A pilot plant capable of treating 2000 N cu m per hr of exhaust gas was tested for denitrification capacity by ozone oxidation and reduction and for the purpose of obtaining data essential to the selection of practical processes and scaling-up. In this test a denitrification capacity exceeding 90% was observed and one O3 concentration at an inlet was nearly zero. Based on the results of the first pilot test, a second pilot test was initiated in October 1974 to obtain data necessary for design of a large-scale denitrationer, operation, and maintenance and at the same time to confirm the quality of nitric acid and gypsum. Oxidation by ozone-absorption, consisting of an oxidation-nitric acid recovery process, an oxidation-condensation process, oxidation-absorption by an alkaline solution, and treatment of surplus O3 is characterized by its remarkably high denitrification rate. A closed system is feasible in this process in the recovery of HNO3. Ozone is added to the exhaust gas from a boiler, which as been reduced to temperature that is appropriate forr oxidation, in order to convert nitrogen oxides to nitrogen anhydride which in turn is absorbed into water. Eight to ten percent of the HNO3 is recovered. In the oxidation-absorption by an alkaline solution process, nitric oxide is oxidized to nitrogen dioxide by O3 and then washed with sodium sulfite, procuding sodium nitrite sodium hydrogen sulfite, and gypsum. Ozone in excess of the reaction equivalent for the oxidation of NO to N2O5 is required. Surplus O3 in exhaust gas which undergoes denitrification is decomposed by reduction. The decomposition is noticeably promoted by utilizing liquid-phase catalysts.

54767 **APTIC NO. 79553**

Azuma, Tadahiro, Hiroshi Tomoto, Kaoru Sato, Yasuo Omotehara, Isao Nagaishi, and Fumio Tsujimoto

A STUDY OF THE REDUCTION OF NITROGEN OXIDES EMITTED FROM THE COMBUSTOR. (3RD REPORT). TRIAL PRODUCTION OF RECIRCULATION AND TWO STAGE COMBUSTION OIL BURNER. *(Nensho sochi no okeru chisso sankabutsu teigenka no kenkyu. (Dai 3 po). Saijunkankei oyobi nidan nensho gata yu bana no shisaku). Text in Japanese. Osaka-Furitsu Kogyo Gijutsu Kenkyusho Hokoku (Osaka Prefect. Res. Inst. Ind. Technol. Rep.), no 66:13-18, July 1975. 3 refs.*

Based on the finding that the distribution pattern of nitrogen oxides concentration in flame corresponded to the distribution pattern of flame temperature, a combustion gas recirculation burner and two-stage combustion burner were developed and tested. In the recirculation burner with fuel and air injection ports placed in a manner so that the fuel and air are injected in tangential direction, a part of the combustion gas is recirculated into the center region (negative pressure) of the vortex core of the flame by the reverse flow in order to facilitate the gasification of fuel for more uniform combustion. In this case, the temperature distribution in the combustion chamber was more uniform. However, the NOx concentration was increased due to the high thermal load and increased residence time at the high temperature region caused by the vortex flow. In the two-stage burner, the secondary air intake port was added to the above- mentioned recirculation burner. The two-stage combustion burner with vortex combustion in the primary combustion region was more effective for NOx reduction than the vertical combustion type two-stage burner when the ratio of air injected from the primary air intake port to the total air was less than 70%. In this case, however, the injection method of secondary air was an important factor affecting the NOx reduction rate.

54768 **APTIC NO. 78996**

Baruch, Stephen andd Sue G. Lerner

A COMMENT ON THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY S FLUE GAS DESULFURIZATION POLICY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 9p., 1975. 10 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-11.2.)*

Flue gas desulfurization technology, as nurtured by the Environmental Protection Agency, is discussed in relation to the requirements of second generation control. As a first generation abatement strategy designed to reduce the ambient concentrations of sulfur dioxide, flue gas desulfurization is rapidly becoming obsolete. Recent studies suggest that SO2 may be an indicator of other more harmful secondary chemical combinations rather than a significant causative agent at ambient concentrations. Therefore, controlling 80-90% of the sulfur oxides from a power plant may not preclude the formation of specific secondary aerosols and particulate complexes which exert effects on human health. Second generation control appears to require major modifications to flue gas desulfurization to reduce the ambient concentrations of nitrates, sulfates, and respirable particulates.

54769 **APTIC NO. 77013**

Bendelius, Arthur G.

DESIGN CRITERIA FOR VEHICULAR ROAD TUNNELS. *ASHRAE (Am. Soc. Heating Refrig. Air Cond. Engrs.) J., 1975:26-31, June 1975. 5 refs.*

Criteria for designing road tunnel ventilation systems that minimize the concentration of vehicle exhaust constituents (carbon monoxide, carbon dioxide, nitrogen oxides, sulfur dioxide, and aldehydes) are presented. Longitudinal ventilation is most effective in a unidirectional tunnel. The air velocity within the roadway area is uniform throughout the tunnel, and the contaminant concentration increases from zero at the entering portal to a maximum level at the exit portal. Uniform distribution or collection of air throughout the length of a tunnel is the chief characteristic of a semi-transverse ventilation system. Unlike longitudinal ventilation, this system is not adversely affected by atmospheric conditions because of its fan-induced flow. Along tunnels generally require the inclusion of a full transverse system. A full exhaust duct is added to a semi- transverse system, thus achieving a uniform distribution of supply air and uniform collection of vitiated air.

54770 **APTIC NO. 79519**

Bjerklie, John W., Elton J. Cairns, Charles W. Tobais, and David Gordon Wilson

ALTERNATIVE POWER SOURCES FOR LOW EMISSION AUTOMOBILES. *Automotive Eng., 83(10):64-67, Oct. 1975. (Presented at the Automobile Engineering and Manufacturing Meeting, Detroit, Mich., Oct. 13-17, 1975.)*

A survey of alternative power sources for low emission automobiles is summarized. There are no alternative engines that can be available in mass production for automobiles of standard size and performance before the 1980 s. All the alternative heat engines can be made to meet the 1978 emission standards, with Stirling engines and steam engines able to do so with least controversial interpretation. Stirling engines should ultimately be technically competitive with spark ignition engines over the power spectrum used by conventional automobiles. Steam engines are technically suitable as an exhaust clean engine for powering light weight cars. It is feasible to manufacture electrically-driven personal vehicles for restricted urban use. None of the alternative engines have a suitable cost structure for use in conventional automobiles.

54771 **APTIC NO. 77115**

Bozzuto, C. R., J. H. Fernandes, F. J. Hanzalek, and A. L. Plumley

AIR POLLUTION ASPECTS OF ALTERNATIVE ENERGY SOURCES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1975. 30 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-46.4.)*

Air pollution considerations associated with current utility power production processes (fossil fuel combustion), near future processes (coal liquefaction and gasification, refuse and sludge combustion, and shale oil utilization), and long-term alternatives (fuel cells, and magnetohydrodynamics) are discussed. Particulate matter emissions which are characteristic of coal and oil-burning processes can be collected with electrostatic precipitators, while gaseous emissions of sulfur oxides and nitrogen oxides can be reduced by fuel preparation or various stack gas conditioning processes. Similar controls can be used to clean emissions from coal gasification processes. Air pollution control in coal liquefaction is based on treating the generated fuel gas with a dimethanolamine absorber, the integration of certain process units into a closed blowdown system, and the collection and conversion of hydrogen sulfide from various gas streams. Refuse and sludge combustion processes can be controlled with electrostatic precipitators and proper firing techniques to assure complete combustion. The off-gases from shale retorting normally possess enough heat value to be burned. Consequently, these gases are normally cleansed of both particulate matter and sulfur by standard techniques. Fuel cells are generally considered as clean energy producers. The by-product carbon monoxide is recycled in the process. There is serious concern about the prospects of controlling nitrogen oxide emissions from MHD power stations. Combustion at high temperatures produces NOx even with control techniques such as two-stage combustion. Some form of NOx scrubbing may be required.

54772 **APTIC NO. 79201**

Cassady, Philip E.

THE USE OF METHANOL AS A MOTOR VEHICLE FUEL. *Preprint, American Chemical Society, Washington, D. C., 12p., 1975. 43 refs. (Presented at the American Chemical Society, National Meeting, 169th, April 7-11, 1975.)*

The feasibility of using methanol and methanol-gasoline blends as motor vehicle fuel is discussed along with the advantages arising from reduced exhaust emissions. The leaner operation possible with methanol-fueled vehicles results in significant carbon monoxide emission reductions and also slight reductions in hydrocarbon emissions. The effect of methanol on hydrocarbon emissions is not easily discerned, however, since the constituents of unburned methanol are different than those for gasoline. There is also a possibility of increased emissions of formaldehyde when methanol is used as a fuel. Nitrogen oxide emissions are reduced in methanol-powered vehicles if the vehicle is originally adjusted to operate at or near an equivalence ratio of unity on gasoline and not modified when a methanol blend is substituted. If the vehicle originally operated fuel rich, however, the leaning effect of the blend increases the NOx emissions. The number of miles travelled per Btu is greater for methanol than for gasoline because of the greater thermal efficiency of methanol.

54773 **APTIC NO. 75893**

Chehaske, John T. and John R. Cline

TESTING OF A MOLECULAR SIEVE USED TO CONTROL MERCURY EMISSION FROM A CHLOR-ALKALI PLANT, VOLUME I (FINAL REPORT). *Engineering- Science, Inc., McLean, Va., Environmental Protection Agency Contract 68-02-1406, Program Element 1AB015, ROAP 21AFA-106, Rept. EPA-650/2-75-026-a, 62p., March 1975. 4 refs.*

NTIS: PB 242005/AS

A Union Carbide PuraSiv mercury adsorbent unit was field tested for its ability to control mercury emissions from the by-product hydrogen stream of a mercury-cell chlor-alkali production facility. Adsorber inlet and outlet streams were sampled simultaneously during five consecutive 24-hour adsorption cycles, with eight sampling runs per cycle. Inlet mercury concentrations were stable at 6-10 mg/normal cu m. Outlet mercury concentrations of 0.5 and 3.5 mg/normal cu m were approached at the beginning and the end of each adsorption cycle, respectively. This occurrence was due to the molecular sieve's operation at nearly 150% of its design capacity of 49.6 normal cu m/min. The estimated outlet mercury concentration from the PuraSiv Hg unit operating at design capacity is 2.0 micrograms/ normal cu m throughout each adsorption cycle, representing a 99.0% collection efficiency. (Author abstract modified)

54774 **APTIC NO. 75891**

Cooper, D. W. and D. P. Anderson

DYNACTOR SCRUBBER EVALUATION (FINAL REPORT). *GCA Corp., Bedford, Mass., GCA Technology Div., Environmental Protection Agency Contract 68-02-1316, Task 6, Program Element 1AB012, ROAP 21ADL-004, Rept. EPA-650/2-74-083-a, GCA-TR-74-21-G, 116p., June 1975. 14 refs.*

NTIS' PB 243365/AS

A Dynactor aspirative spray scrubber was tested for power consumption and collective efficiency at three flow rates, two temperatures, two dust loading levels, and with two different dusts. Higher efficiencies were fostered by lower flow rate, lower inlet temperature, and higher mass loading. The collection efficiency of the Dynactor was not substantially different from that expected for a well-designed venturi scrubber operating at the same power level and air flow rate. Efficiencies of over 99% were obtained for particles larger than 2.5 micron; for fine particles smaller than 1 micron, the collection efficiency decreased sharply as with other scrubbers of similar power consumption. (Author abstract modified)

54775 **APTIC NO. 77277**

Cooper, Douglas W.

FINE PARTICLE CONTROL BY ELECTROSTATIC AUGMENTATION OF EXISTING METHODS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. 17 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-02.1.)*

An analysis of fine particle collection forces is presented, and the augmentation of conventional collection devices, e.g., scrubbers, with electrostatics is discussed. Calculations are performed to show the following ordering of forces (from largest to smallest) for a 1 micron particle: Coulomb force between a charged particle and charged collector, the force between a charged collector and uncharged particle, the force between a charged particle and uncharged collector, and the force due to mutual charged particle repulsion toward a collector. Also presented are equations and some calculations for mutual repulsion of particles (electrostatic scattering), deflection in a magnetic field (Lorentz force), and the enhancement or inhibition of collection on a charged cylinder in an electric field. (Author abstract modified)

54776 **APTIC NO. 79380**

Dziembowski, H. von, H. Hennecke, and F. Thelen

PLANNING OF THE HARD COAL FIRING SYSTEM FOR THE POWER PLANT WILHELMSHAVEN. *(Die Planung der Steinkohlenfeuerung fuer das Kraftwerk Wilhelmshaven). Text in German. VGB Kraftwerkstechnik, 55(6):343-354, 1975. 4 refs.*

The plans of the hard coal firing system for the new large-capacity power plant Wilhelmshaven are presented. The power plant is designed to use hard coal, and oil as an auxiliary fuel. A permit for the construction has been granted under the provision that a stack with a minimum height of 275 m will be built, and that the flue gases will be dedusted to a residual dust concentration of 75 mg/cu m. In addition, the flue gases will have to de desulfurized first partially, and then quantitatively beginning in 1980. The sulfur dioxide emission is limited to 5 tons/hr until 1980, and to 2.5 tons/hr afterwards. The flue gases coming from the economizer are first dedusted in electrostatic precipitators, after which they are washed with dilute calcium hydroxide solution in a 45 m high scrubbing tower. In a first stage, the flue gases are saturated with vapor. After droplet separation, the cleaned gases are heated up to 90 C and discharged into the atmosphere.

54777 **APTIC NO. 79420**

Eisenhut, Werner and Hans-Udo Friedrich

THE REDUCTION OF EMISSIONS FROM COKING PLANTS. *(Die Verminderung der Emissionen auf Kokereien). Text in German. Glueckauf (Essen), 111(9):432-439, 1975. 13 refs.*

New Techniques and processes developed for air pollutant emission abatement at coking plants in Western Europe, the USA, and Japan are surveyed. Dust emissions generated during the handling, transfer and treatment of coal and coke are abated by the use of closed conveyor belts, through a minimization of transfer points, and, in the case of coke dumps, by regular wetting of the surface. Sulfur-free or partially desulfurized coke oven gas is used for the coking process. Desulfurization is possible by ammonia-hydrogen sulfide scrubbing in a closed cycle. Charging carts with wet type dust separators are used for coal charging in most European coking plants. Sequential charging and stage charging avoid the use of wet type dust separators. The waste gases escaping during tamping charging are incinerated with air oxygen. The use of preheated coal also reduces the pollutant emissions. Coke ovens must be made tight to avoid gas discharges during the coking process. Emissions during discharge and coke quenching can be reduced by different designs of closed quencher cars, quencher cars with suction hood and dust separator, or dry quenching, which can be combined with the coal preheating procedure.

54778 **APTIC NO. 77282**

Feldman, Paul L.

EFFECTS OF PARTICLE SIZE DISTRIBUTION OF THE PERFORMANCE OF ELECTROSTATIC PRECIPITATORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75.02-3.)*

A theoretical analysis of the effect of particle size distribution ofthe performance of electrostatic precipitators is presented. The size dependence of particle charging and transport in calculating migration velocities as a function of particle size is considered, and overall collection efficiency is determined by integrating over a given size distribution. The particle size distribution changes as precipitation proceeds, and thus the effective migration velocity as defined in the Deutsch equation also varies with precipitator length. This represents a serious limitation to the use of the Deutsch equation. However, the effective migration velocity can be treated as a constant if the Deutsch equation is modified to incorporate an exponent which is dependent on inlet size distribution. Computed outlet size distribution and fractional efficiency curves are presented as a function of inlet size distribution and overall efficiency, and it is shown that a minimum in fractional efficiency exists for particles between 0.2 and 0.5 micron in diameter. (Author abstract modified)

54779 **APTIC NO. 79447**

Fischer, H. and E. Ruhl

THE CLAUS PROCESS FOR PRODUCTION OF ELEMENTAL SULFUR. *(Das Claus-Verfahren zur Gewinnung elementaren Schwefels). Text in German. Chem. Ind. (Duesseldorf), 27(7):379-383, 1975.*

The combined Claus Sulfreen process for the recovery of elemental sulfur from gases generated by the desulfurization of natural gas, petroleum fractions, or coal is described. The hydrogen sulfide-containing waste gases are first reacted with air and oxygen between 800 and 1200 C to obtain elemental sulfur at a conversion rate of 60-70%. Further conversion of H2S and sulfur dioxide into elemental sulfur, and hydrolysis of carbon disulfide and carbon oxysulfide take place in a two-stage reactor with activated alumina catalyst. Here, conversion rates over 90% are reached for COS and CS2. The overall conversion rate amounts to 97%. The waste gases, containing

H2S, SO2, and sulfur vapors in 1-2 g/cu m concentration, are admitted to the Sulfreen stage for the low-temperature conversion of H2S into sulfur by means of a highly active, impregnated catalyst which serves as an adsorber for sulfur as well. The waste gases leaving the Sulfreen stage contain 2000-3000 ppm of sulfur compounds, mainly H2S and SO2. These waste gases are burnt in an afterburner to convert all sulfur compounds into SO2. The heat generated in this process is used for the thermal desorption of elemental sulfur from the catalyst. The combined Claus-Sulfreen process permits overall conversion rates around 98% to be achieved.

54780 **APTIC NO. 77072**

Fraser, Malcolm D. and Douglas R. Eaton

COST MODELS FOR VENTURI SCRUBBER SYSTEMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-30.4.)*

Cost models for venturi scrubber systems which are based on the costs of major subcomponents of the system are described. The total capital cost of a venturi scrubber system is determined by summing the estimated individual costs of the scrubber, entrainment separator, pumps, blower and motor, scrubbing water treatment system, dampers, other auxiliary equipment, and installation. The operating cost model is comprised of maintenance cost, water treatment cost, power cost, and water cost. The cost models are designed for use with a performance model which expresses the scrubber design and performance in terms of the fundamental principles involved. The combination of the cost and performance models provides a tool for analyzing costs involved in designing new scrubbers or upgrading existing venturi scrubbers to meet more stringent airborne particulate control requirements. (Author abstract modified)

54781 **APTIC NO. 77103**

Gille, James A. and Bertram M. Anz

PARTICULATE AND SO2 REMOVAL SYSTEMS AT EDDYSTONE STATION OF PHILADELPHIA ELECTRIC COMPANY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-48.1.)*

The particulate and sulfur dioxide removal systems at the Eddystone station of the Philadelphia Electric Company are described. The station includes two coal-fired units each having a generating capacity of 360 MW. The flue gas desulfurization system at the station is a regenerative magnesium oxide scrubber. The scrubbing system is divided into three trains with 1/3 of the total flue gas (975,000 cu ft/min) passing through each train. Each train also includes a particulate scrubber, reheater, and booster fan. Magnesium sulfite formed in the scrubber is trucked to a sulfuric acid plant about 20 mi away for regeneration to MgO. The total capital cost for the scrubbing system is between $55-65/kw. Operating costs range between 2.6 and 3.0 mils/kw.

54782 **APTIC NO. 79495**

Gogineni, M. R. and P. G. Maurin

SULFUR OXIDES REMOVAL BY WET SCRUBBING APPLICATION TO UTILITY BOILERS. *Combustion, 47(4):9-15, Oct. 1975. 8 refs. (Presented at the Frontiers of Power Technology Conference, Stillwater, Okla., Oct. 1-2, 1975.)*

The Air Quality Control System described has wet scrubbers preceded by fly ash collection and includes the capability of bypassing the wet scrubbing system. The scrubber is described, including reaction tanks. The buffering action of the carbonate-bicarbonate couple in the limestone system maintains a system pH between 5 and 7, completely eliminating the possibility of calcium sulfite formation. Calcium sulfate scaling can be minimized by circulating calcium sulfate seed crystals to provide nucleation sites for the nonscaling forming homogeneous precipitation of calcium sulfate. Forced oxidation is not employed with lime systems. Coprecipitation of calcium sulfate with calcium sulfite occurs in these lime/limestone wet scrubbing systems. Units using this type of system are described. Particulate matter and sulfur dioxide are usually removed separately; consequently spray towers are being developed and designed. By-product recovery is technically feasible, but application is limited to those areas where either disposal is prohibited or where localized market conditions make regeneration and recycling attractive. The system design is summarized.

54783 **APTIC NO. 79533**

Haenssgen, T. and L. Zimmermann

ELECTROSTATIC FLY-ASH PREPARATION IN EAST GERMANY. *(Elektroodlucovace pro cisteni spalin v NDR). Text in Czech. Strojirenstvi, 25(2):119-123, Feb. 1975. 4 refs.*

Increasing demands for clean air and continuous use of brown coal as the principal fuel by the East German electric power industry required new improvements in fly-ash removal from exhaust fumes. Over the past 10 years the electrostatic separators produced by VEB Entstaubungstechnik EAM underwent significant structural improvements which greatly reduced their weight. This reduction was mainly achieved by replacing the old screen electrodes by electrodes of cylindrical shape and was required especially by fly-ash separators to be installed in newly constructed power plants. Since a high degree of separation is obtained with slow rates of flow of the exhaust gas, the units placed into production were designed for rates of flow up to 2.5 m/sec and have an effectivness of separation of 99% or higher. The capacity of a typical unit is 2 million cu m/hr, but units with capacities of 5 million cu m/hr are currently being developed.

54784 **APTIC NO. 75896**

Hall, E. H., D. B. Peterson, J. F. Foster, K. D. Kiang, and V. W. Ellzey

FUELS TECHNOLOGY: A STATE-OF-THE-ART REVIEW (FINAL REPORT). *Battelle Memorial Inst., Columbus, Ohio, Columbus Labs., Environmental Protection Agency Contract 68-02-1323, Task 14, Program Element 1AB013, ROAP 21ADE-010, Rept. EPA-650/2-75-034, 253p., April 1975. 86 refs.*

NTIS: PB 242535/AS

A state-of-the-art review of various fuel-cleaning, fuel- conversion, and emission-control technologies is presented. Classes of technology included in the study are: physical and chemical coal cleaning, residual oil desulfurization, coal refining (liquefaction), coal and oil gasification, fluidized-bed combustion of coal, and stack gas scrubbing. The extent of current practice and the status of systems under development are presented for each technology. (Author abstract modified)

54785 **APTIC NO. 79056**

Harpel, William L., Anthony J. Graffeo, Douglas T. Murray, and Richard C. Schwarz

ASPECTS OF CORROSION AND DEPOSITION CONTROL IN SCRUBBER SYSTEMS FOR INCINERATOR AND FOSSIL FUEL BOILER EFFLUENT GASES. *Preprint, American Inst. of Chemical Engineers, New York and the Environmental Protection Agency, Research Triangle Park, N. C., 41p., 1975. 25 refs. (Presented at the Complete Watereuse: Water s Interface with Energy, Air, Solids, National Conference, 2nd, Chicago, Ill., May 4-8, 1975.)*

Various scrubbing processes for the removal of sulfur dioxide and/or particulates from incinerator and boiler flue gases are described along with techniques for controlling corrosion and solids deposition in the scrubbing equipment. Lime/limestone scrubbing is the most common method for sulfur dioxide control. Scaling problems can be controlled by minimizing the oxidation of sulfite to sulfate. Accurate pH control and the use of deposit control agents can be employed to reduce deposit buildup in these systems. Problems encountered with magnesium oxide slurry systems are similar to those associated with lime- limestone systems. Careful control of the pH is necessary to minimize precipitation of the monosulfite. Deposit control agents are also used to minimize scaling problems. Double alkali systems exhibit reduced scaling and fouling as compared with the above two scrubbing systems; however, capital and chemical costs are higher with this type of process. Corrosion inhibitors or the use of more durable alloys or linings are commonly employed in fly ash scrubbing systems to overcome the characteristically aggressive chemical environment of such systems. Scaling and fouling are less severe than that encountered in lime-limestone or magnesium oxide scrubbers for SO2 control.

54786 **APTIC NO. 77286**

Hebrank, William H.

REDUCED SMOKE EMISSION AND FUEL CONSUMPTION OF A TEXTILE TENTER DRYER BY RECYCLING COMBUSTION FLOWS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 12p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-20.4.)*

Modifications made to an existing indirect fired textile tenter dryer to eliminate stack smoke and save fuel are described. The system uses process exhaust for combustion air, and the incineration occurs in the combustors that supply process heat. This is accomplished with two large recycle loops which ingest process exhaust, pass through the dryer s burners and heat exchangers in parallel, and then split off some flow for exhaust with subsequent heat recovery for another process. The loops are designed to consume oxygen down to the 18% by volume level so that the contamination makes about four trips through the combustion zones before exhausting. The final exhaust to the atmosphere is completely clear, and fuel savings are 60% for the dryer.

54787 **APTIC NO. 77078**

Hesketh, Howard E.

AEROSOL CAPTURE EFFICIENCY IN SCRUBBERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1975. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-50.6.)*

The aerosol capture efficiencies of a portable 1 cfm miniscrubber and a 1500 cfm pilot venturi scrubber used to treat flue gases generated from a coal-fired chain grate boiler were evaluated. The mini-scrubber and pilot scrubber were about 9% and 5%, respectively, less efficient than predicted for full-scale industrial scrubbers, although they produced aerosol collection efficiency data that were similar to data obtained from large industrial scrubbing systems. This indicated that small scrubbers possess a built-in overdesign factor and can provide valuable prediction and scale up data. Essentially 100% collection efficiency was obtained with the two scrubbers for aerosols larger than 3 micron. (Author conclusions modified)

54788 **APTIC NO. 76971**

Honda, Shoichi

COMBUSTION CHAMBER FOR INTERNAL COMBUSTION ENGINES. *(Nainen kikan no nenshoshitsu sochi). Text in Japanese. (Honda Motor Co., Ltd., Tokyo (Japan)) Japan. Model Util. Sho 50-14006. 2p., April 30, 1975. 1 ref. (Appl. May 4, 1971, 1 claim).*

The conventional torch type ignition mechanism of internal combustion engines is accompanied by the fault that the ignition plugs are often wetted by fuel-air mixtures with high gasoline content. This fault is eliminated by the present invention whereby the combustion chamber is constructed with a main combustion chamber and a subsidiary combustion chamber. These chambers are connected with each other through a cylindrical hole. The cylindrical hole is coaxially placed in the fuel supply tunnel. At the end of the hole, another hole is made perpendicular to the cylindrical hole. This hole is directly adjacent to a cavity in which the ignition plug is placed. With this construction, the fuel air mixture flows smoothly and gently into the ignition plug chamber. Therefore, the torch is hardly blown off, as is often the case with conventional engines. Also, the concentrated gas introduced from the fuel supply tunnel contacts the dilute gas in the main cylinder at the end of the cylindrical hole resulting in satisfactory mixing of both gases. The dew drops of gasoline, which are hazardous in the torch effect of the engines, hardly wets the ignition plug, because the plug is placed sideways or perpendicular to the flow direction of the supplied air-fuel mixture.

54789 **APTIC NO. 76955**

Hoshizawa, K., T. Sema, K. Sonoda, K. Endo, K. Kumai, and K. Koyata

STUDY ON METHANOL COMBUSTION (PART II) -- COMBUSTION STATUS AND FLUE GAS PROPERTIES AT FULL LOAD. *(Metanoru nensho ni kansuru kento (Sono 2): Zen fuka senshodoki ni okeru nensho jyokyo to haigasu seijo). Text in Japanese. Denryoku Chuo Kenkyusho Gijutsu Daiichi Kenkyusho Hokoku (Tech. Lab., Central Res. Inst. (No. 1) Electric Power Ind. Rept.), no. 74082:1-25 and A-1 - A-9, May 1975. 11 refs.*

Combustion of methanol at power plants was studied by using 4 different methanol fuels. The methanol fuels for study were crude methanol, industrial methanol, crude methanol containing 5% sea water and industrial methanol containing 5% higher alcohol. Nitrogen oxides concentration was below 30 ppm with methanol as fuel regardless of the oxygen concentration, compared to a 150- 400 ppm level with C-oil as fuel at 0.5-3% O2. At 2% CO2 or above, the carbon monoxide was at the same level (approximately 10 ppm) as in the case of residual oil, but the concentration increased remarkably at O2 concentrations below 2%. Industrial methanol gave 5 ppm total hydrocarbon concentration at 1% O2 while crude methanol gave 1 ppm total hydrocarbons at 0.5-3% O2. Methanol yielded the same level of organic compounds such as aldehydes as residual oil. Dust concentration in the flue gas was almost negligible. Methanol containing higher alcohols gave higher NOx concentration while that containing sea water gave lower NOx concentration. A steam atomizing burner was appropriate for methanol combustion and the optimum O2 concentration was about 2%.

54790 **APTIC NO. 79342**

Ibing, R.

AIR SEPARATION AND DE-DUSTING - COMMON AND CONTRADICTORY FEATURES. *(Sichten und Entstauben, Gemeinsamkeiten-Gegensaetze). Text in German. Zement-Kalk-Gips (Wiesbaden), 28(3):115-118, 1975.*

The common and contradictory features of air separation and dust separation, and the mechanism and efficiency of air separation processes are discussed. While air separation is used in technological processes for the separation of binary mixtures into coarse and fine fractions, which is possible by gravitational air separation, especially in the case of large particles, or by centrifugal separation in the case of fine materials, dust separation serves to separate particulate matter from air and gases. While dedusting processes, especially those involving the use of cyclones, have a certain air- separating effect, dust separators are not suitable for the solution of air-separation problems.

54791 **APTIC NO. 79299**

Ishihara, Yoshimi

NOX CONTROL OF COMBUSTION APPARATUS AND PROBLEMS OF STACK GAS DENITRIFICATION. (Nensho sochi no NOx hassei yokusei to haien dassho-ho no mondaiten). Text in Japanese. Preprint, Japan Management Association, Tokyo, p. 103, 1975. (Presented at the Environmental Pollution Control, Technical Symposium, Tokyo, Japan, March 17, 1975.)

The current problems and countermeasures for nitrogen oxides in flue gases are listed. Thermal conversion of nitrogen in air to NOx ranges from 0.1% to 0.01% upon fuel combustion, while the oxidation of nitrogen in fuel to NOx occurs with 15% to 45% conversion of the nitrogen compounds contained in the fuel. The countermeasures for NOx formation include improvement of combustion systems such as two-stage combustion, exhaust gas mixing, and low oxygen combustion. These methods decrease NOx emission in flue gas by 20 to 30%. The use of a catalytic flue gas denitrification apparatus also decreases the NOx level in the flue gas. It is necessary to use catalysts with longer life and less susceptibility to sulfur dioxide poisoning. Secondary pollution accompanying the denitrification process such as ammonia emission is undesirable and effective reduction of such products to useful by-products should be aimed for.

54792 **APTIC NO. 79557**

Ito, Takusen and Kenji Onose

ACCIDENT PREVENTION DEVICE IN EXHAUST GAS COMBUSTION EQUIPMENT. *(Haigasu nensho sochi ni okeru saigai boshi sochi). Text in Japanese. (Hitachi Shipbuilding and Engineering Co., Ltd. (Japan)) Japan. Pat. Sho 50-21788. 3p., July 25, 1975. (Appl. Feb. 8, 1972, 1 claim).*

An accident prevention device in a combustion furnace is described. A steam header with a number of nozzles is equipped on top of a combustion furnace. Steam is supplied through four steam ducts to the steam header, which surrounds the furnace. A thermometer is equipped at the valve of each steam duct. When downdraft is caused by strong wind and the high temperature waste gas is blown to a lower altitude, the thermometer senses the abnormal temperature increase and the steam valves are opened by an automatic transmitter. The steam sprayed from the nozzles forms a thin steam wall which not only prevents further downdraft but also reduces the waste gas temperature.

54793 **APTIC NO. 79410**

Iwadare, S.

SIMULTANEOUS DEODORIZATION AND SEWAGE TREATMENTS BY PHOTOSYNTHETIC BACTERIA AND WOOD-VINEGAR. *(Hikari gosei saikin to mokusaku ni yoru dasshu to haisui no doji shoriho). Text in Japanese. PPM (Japan), 6(10):47-53, Oct. 1975.*

The simultaneous deodorization and sewage treatment process using photosynthetic bacteria and wood-vinegar was developed and patented. Three types of photosynthetic bacteria, athiorhodaceae, thiorhodaceae and chlorobacteriaceae were cultured in a wood-vinegar medium containing acetic acid, formic acid and propionic acid which are essential elements for the culture of these bacteria. By the strong digesttive effect of photosynthetic bacteria, the organic acids in night soil and sewage water are decomposed, and as the result the growth of malodor producing anaerobic bacteria is suppressed, while the growth of aerobic bacteria is facilitated. The wood-vinegar solution with cultured photosynthetic bacteria is simply added to the digestion tank or other treatment tanks, and the marked deodorization effect (ammonia) and improvement in pH, biochemical oxygen demand, chemical oxygen demand and SS are achieved.

54794 **APTIC NO. 79418**

Iwai, Nobuo, Hideo Sudo, and Tadashi Ito

STUDIES ON THE METHANOL ENGINE FOR AUTOMOBILE: ON FORMALDEHYDE IN EMISSION GAS. *(Jidoshayo metanoru kikan no kenkyu: Haikigasu chu no horumuarudehido ni tsuite). Text in Japanese. Preprint, the Society of Automobile Engineers of Japan, Tokyo, p. 633-640, 1975. 11 refs. (Presented at the Society of Automotive Engineers of Japan, Lecture Meeting, Kyoto, Oct. 29-30, 1975.)*

Emission characteristics of formaldehyde from methanol engines were investigated by gas chromatographic analysis of exhaust gas. The emission concentration of HCHO from methanol was higher compared to that of gasoline. The HCHO emission concentration was increased at low vaporization rate, low load and low temperature. The operation at low fuel ratio and use of CH3OH containing water for the purpose of reducing nitrogen oxides emission resulted in increase in HCHO emission. With the decrease in unreacted CH3OH, the HCHO emission concentration was also decreased. The correlation between HCHO and unreacted CH3OH was significant when cooling water temperature, load, ignition timing, vaporization rate and mixing ratio of water were varied while maintaining the excessive air ratio at constant. The HCHO can be removed by aftertreatment such as catalytic oxidation.

54795 **APTIC NO. 77074**

Jashnani, I. L.

COLLECTION EFFICIENCY OF ENTRAINMENT SEPARATORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-30.2.)*

Factors affecting the collection efficiency of entrainment separators are discussed, and a new approach for modeling collection efficiency which incorporates the concept of backmixing is presented. The primary collection efficiency of an entrainment separator is equal to the total collection efficiency in the absence of reentrainment which occurs as the gas velocity is increased. Industrial operating velocities are such that reentrainment is not present during the collection of liquid droplets or solids. The lower limit of the particle diameter that can be effectively separated in entrainment separators varies from 1-40 micron, depending on the separator design. Particles larger than 1-2 micron in diameter are usually collected by impaction mechanisms. A model that takes into account the fact that turbulence and flow in the gas stream cause a continual backmixing of the suspended (uncollected) drops in the gas is developed and found to agree well with experimental data on collection efficiency. (Author abstract modified)

54796 **APTIC NO. 79504**

Jensen, G. A.

THE KINETICS OF GASIFICATION OF CARBON CONTAINED IN COAL MINERALS AT ATMOSPHERIC PRESSURE. *Ind. Eng. Chem., 14(3):308-314, July 1975. 25 refs.*

The kinetics of the gasification of carbon contained in coal minerals obtained from Kentucky Number 9 coal were studied. A batch fluidized bed reactor was operated at temperatures between 1040 and 1430 C to produce synthesis gas (carbon monoxide and hydrogen) by the reaction of carbon with steam. The carbon-steam reaction was slow. The reaction rate was controlled and independent of particle size. Pyritic sulfur was converted to hydrogen sulfide. A shrinking core model adequately represented the carbon-steam reaction until melting or sintering occurred within the bed.

54797 **APTIC NO. 79463**

Juentgen, H., W. Peters, and K. Knoblauch

THE BERGBAU-FORCHUNG PROCESS FOR THE DESULPHURISATION OF FLUE GASES. *Preprint,* *World Petroleum Congress, Tokyo (Japan), Japanese Organizing Committee, 9p., 1975. 9 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

Laboratory and pilot-scale tests involving the Bergbau-Forschung desulfurization process are discussed along with the construction of a prototype plant. The prototype plant is capable of removing about 350 kg of sulfur dioxide/hr. The flue gases are conveyed to an adsorption reactor containing a column of activated coke. The activated coke is regenerated by mixing it with hot sand for a residence time of about 15 min. Sulfur dioxide-rich gas leaving the regeneration vessel is processed into sulfur by reacting the gas with coke oven gas and air resulting in the formation of hydrogen sulfide, sulfur, and sulfur dioxide. After removal of the sulfur, the mixture of hydrogen sulfide and sulfur dioxide passes through a three-stage Claus converter. The sulfur obtained during reduction in the combustion chamber and the sulfur condensed out behind the Claus converter are passed to a sulfur tank for intermediate alloying. The flue gas of the sulfur production plant are burned in a combustion unit and are then fed back to the flue gas before the desulfurization reactor.

54798 **APTIC NO. 77043**

Kasaoka, Shigemitsu and Hisashi Nagisa

DECOMPOSITION OF NH_3 BY CATALYSTS OF REDUCTION METALS, OXIDES, AND SULFATES, AND OXIDATION SPEED BY O_2. *(Kangen kinzoku sankabutsu ryusanen kei kaku shokubai ni yoru NH3 no bunkai to O2 ni yoru sanka sokudo). Text in Japanese. Preprint, The Society of Chemical Engineers, Japan (Tokyo), p. 246-247, 1975. 1 ref. (Presented at the Society of Chemical Engineers, Japan, Lecture Meeting, 40th, Nagoya, Japan, April 2-4, 1975.)*

Nitrogen oxides and sulfur oxides in a mixture of NO_x, SO_x, oxygen, water, carbon dioxide and nitrogen may be cleaned by ammonia in dry and selective reduction (sulfates of copper and iron used as optimum catalysts), and the remaining SO_x may be eliminated by traditional wet reaction absorption. Among the unresolved problems in this method to include nothing to use NH_3 in excess and making it non-toxic. Therefore, in reduction cleaning of NO_x, it is necessary to suppress the side reaction of NH_3 and oxygen as much as possible, using a proper catalyst, and to establish specific operating conditions. Conversely, a catalyst which oxidizes NH_3 to nitrogen, must be sought to reduce emission of surplus NH_3 under the same operation conditions as in reduction. This is especially important when SO_x are not contained. Oxidation speed by O_2 and decomposition of NH_3 were examined in order to make denitrification process more complete, by means of a reduction cleaning catalyst of nitric oxide and oxidation catalyst of surplus NH_3 into N_2 by O_2. The copper sulfate and ferric and ferrous sulfate catalysts were extremely effective as selective reduction cleaning catalysts of NO_2 in a NO_x-SO_x-O_2-H_2O-CO_2-N_2 mixture by NH_3.

54799 **APTIC NO. 76938**

Kato, Isamu

THE MUFFLER EQUIPPED WITH A CLEANER. *(Joka sochi tsuki mafura). Text in Japanese. (Futaba Sangyo Co., Ltd., Okaya (Japan)) Japan. Model Util. Sho 50-15056. 2p., May 12, 1975. 1 ref. (Appl. Sept. 21, 1970, 1 claim).*

Carbon monoxide discharge from gasoline engines is much reduced by the present invention. A muffler consisting of an inlet tube, an outlet tube, and a main cylindrical body is made to include a layer of catalysts that convert carbon monoxide to carbon dioxide. The layer of catalysts is held by means of a cylindrical porous vessel, which is coaxially placed in the main body of the muffler. When a car is being driven at a high speed the engine rotates at a high rate. In this case the discharged gas is made to flow in the muffler without passing through the catalyst layer. Therefore, the presence of the catalyst layer does not hinder the passage of the discharged gas. One important basis of this invention is that the pressure inside the muffler largely changes or fluctuates when the engine is being driven at a slow rate. When the pressure inside the muffler rises instantaneously, most of the discharged gas is forced to pass through the catalyst layer. Also, a leak valve is equipped in the wall of the inlet tube of the muffler. This valve opens when the pressure inside the muffler rapidly lowers resulting in the introduction of air, which is necessary for the combustion of carbon monoxide. Thus this invention is effective to reduce carbon monoxide discharge especially during idling, when the carbon monoxide discharge of a gasoline engine is the highest.

54800 **APTIC NO. 79488**

Kawabe, Atsushi and Hisao Kagawa

WET-TYPE FLUE GAS DESULFURIZATION PROJECT AND ITS ACTUAL ACHIEVEMENT AT KANSAI ELECTRIC POWER CO. *(Kansai Denryoku no shisshiki haien datsuryu keikaku to jisseki). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(9):795-802, Sept. 1975.*

Four wet-type flue gas desulfurization units, in operation at various power plants of Kansai Electric Power Co. since 1973, are described. These installations treat gas in amounts of 100,000 to 500,000 N cu m/hr. Projected percentage desulfurization ranges from 80 to 85%, when projected sulfur content in fuel ranges from 0.5 to 2.0%. Lime-gypsum or limestone-gypsum is used for desulfurization. Power generation at the plants ranges from 35 to 156 MW. Design of the units was improved, as the four were successively built. To prevent scale formation, filtrate from the slurry was no longer used in the cooling tower. One absorption tower instead of two was used after the first unit, and about 10% excess lime was supplied. Disadvantages of neutralization of excess lime by sulfuric acid were offset by savings in construction and power costs. After initial separation, a wet mill was used to grind coarse impurities (mostly limestone) in the raw lime to finer particles, to reduce friction and clogging. Supernatant liquid collected by the mist catcher was used to continuously wash the mist catcher, thus conserving water used for cleansing purposes. By the arrangement of boiler-forcing fan-desulfurization unit-stack, a fan of smaller capacity could be used, than when the arrangement was boiler-desulfurization unit-inducing fan-stack. With the forcing fan, pressure in the absorption tower was above atmospheric; with the inducing fan, below atmospheric. Three more desulfurization units are to begin test operations in 1975-1976. Reduction of construction costs without sacrificing reliability and safety is a major headache.

54801 **APTIC NO. 77046**

Kawasaki, S. and Y. Mori

DENITRIFICATION OF STACK SMOKE BY THE SUMITOMO CHEMICAL COMPANY FORMULA. *(Sumitomo kagaku shiki haien dassho purosesu). Text in Japanese. Sumitomo Kagaku (J. Sumitomo Chem. Co.), vol. 1975-I:57-64, Jan. 1975. 8 refs. (Special Issue).*

The Sumitomo method is based on selective reduction of nitrogen oxides by ammonia, the most suitable catalyst (C-1 catalyst). The D-1 catalyst developed by Sumitomo is capable of withstanding both sulfur dioxide and sulfur trioxide, and A-catalyst is capable of denitrification. In May 1974, waste gas from a boiler at the Higashi Nippon Methanol Co., at Sumitomo s Chiba Plant, was equipped with denitrification equipment for the first time in Japan, treating 20,000 N cu m/hr. The boiler uses liquefied petroleum gas (LPG) and off-gas as fuel. The waste gas is the so-called clean gas. The temperature of waste gas coming out of the boiler is around 300 C. Ammonia is added, and the mixture is then led to a denitrification reactor. Although an afterburner is provided, it is not heated. The ratio of NH_3/NO_x is around 1.0. The oxygen composition of gas, NO_x, around 200 ppm, is 7%. When the gas comes out of the reactor the NOx content is less than 20 ppm, and NH3, less than 10 ppm, the denitrification ratio being 90%. When the waste gas was increased to 250,000 N cu m/hr, the equipment still operated smoothly, maintaining a 90% denitrification ratio. For the denitrification of dirty gas, a semi-commercial plant of 30,000 N cu m/hr-capacity was installed for the package boiler at the Chiba Plant in 1974. With mass production of D-catalysts since the spring of 1974, there has been a smooth operation, maintaining an 80-90% of denitrification ratio.

54802 **APTIC NO. 79086**

Kenson, Robert E.

INTEGRATED NOX POLLUTION ABATEMENT SYSTEMS FOR NITRIC ACID PLANTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-23.6.)*

Control systems for reducing nitrogen oxide emissions in the tail gas of nitric acid plants are reviewed. Systems with proven experience include: catalytic reduction, extended absorption, zeolite adsorption, and flame reduction. The first three are cost-effective abatement systems, whereas the fourth is a last resort method which is never cost effective. The particular situation of a given plant determines which system is the optimum choice. Examples of NOx abatement system requirements for individual nitric acid producers are provided along with a breakdown of NOx abatement costs for various situations. (Author abstract modified)

54803 **APTIC NO. 79526**

Kisarov, V. M. and A. I. Subbotin

RECOVERY OF ORGANIC PRODUCTS AND MONOMERS IN THE PRODUCTION OF PLASTIC MATERIALS. *(Rekuperatsiya organicheskikh produktov i monomerov v proizvodstve plasticheskikh mass). Text in Russian. Plast. Massy, no. 5:27-29, 1975. 26 refs.*

Methods available for the recovery of monomers and other organic substances emitted in the production of plastic materials are reviewed. Adsorption on solid sorbents, especially on activated carbon, is used most widely as it is the most efficient recovery method. The efficiency of this method reaches 99 to 100%. It is advantageously combined with preliminary low-temperature condensation. The minimum condensation necessary for economical and efficient recovery usually ranges from 1.5 to 4.5 g/cu m. Adsorption on activated carbon is used successfully for the recovery of vinyl chloride, vinylidene chloride, vinyl acetate, methyl metacrylate, trichloroethylene, and of the by-products in polyvinyl alcohol synthesis.

54804 **APTIC NO. 79087**

Klooster, H. J., G. A. Vogt, and D. G. Bernhart

APPLIED ODOR CONTROL WITHIN A PETROLEUM REFINERY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-23.7.)*

Odor control techniques for petroleum refineries are reviewed. Maximum use of hydroprocessing is one technique for achieving odorless operation. Hydrogen is reacted with odorous sulfur compounds to produce hydrogen sulfide. The sour gas stream can be treated to remove H2S which is then converted to an essentially odorless marketable sulfur product. Other odor abatement measures include vapor recovery, the discharge of all relief valves which protect hydrocarbon-containing systems to a closed flare system, and the maintenance of proper enclosures and seals on all systems containing odorous materials. Maximum use is made of mechanical seals on pumps to reduce hydrocarbon leakage to a minimum; and all petroleum storage tanks are equipped with floating roofs, vapor recovery systems, or gas blanketing to control evaporative hydrocarbon losses and odorous emissions.

54805 **APTIC NO. 77075**

Klugman, Warren L. and Stanton V. Sheppard

THE CEILCOTE IONIZING WET SCRUBBER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1975. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-30.3.)*

An ionizing wet scrubber system for the collection of submicron particulate matter is described. The scrubber system incorporates the principles of electrostatic particle charging and image force attraction to increase the collection efficiency of particulates in the submicron range. A high voltage ionizer is used to charge the particulate matter before the particles enter a packed scrubber section where they are removed either by inertial impaction or by attraction to a neutral surface. The use of plastic materials throughout the unit makes it impervious to corrosive atmospheres and minimizes maintenance requirements. Both pilot tests and on-stream installation results verify that particles of almost any size or composition are collected. Fine particles (0.05-2 micron) are collected with nearly the same efficiency as coarse particles (2 micron and larger). The collection efficiency remains constant with turndown from 100% to 0% load. Operating variables and performance results from both pilot and field tests of the scrubber system are presented.

54806 **APTIC NO. 77002**

Kobayashi, S., K. Sugito, N. Karasuyam, and H. Okuyama

TESTS ON THE SECONDARY TREATMENT OF FECES AND URINE FILTRATE BY AN EVAPORATING TANK. *(Josan-so ni yoru funnyo roeki no 2-ji shori shiken). Text in Japanese. Tokyo-to Chikusan Shikenjo Kenkyu Hokoku (Res. Rept. Anim. Husb. Exp. Stn. Tokyo), no. 14:95-97, March 1975.*

The secondary treatment of feces and urine filtrate by evaporation was investigated. The filtrate issued from a vacuum dehydrater was treated in an evaporating tank. The areas of the bottom of the tank was 7 sq m. Underground penetration was not used. The filtrate contained 50 ppm of ammonium nitrogen. In the beginning, 900 l/day filtrate was charted into the evaporating tank. However, the water level began to rise soon. Therefore, the volume of charging was changed to 600 l/day after about 1 mo. About 25 cm in depth evaporated sideways through the soil. The water capacity of the soil was 124%. The capillary action was excellent and contributed to the evaporation. The content of ammonium nitrogen was 19 ppm at the soil surface and 21 ppm at a depth of 40 cm.

54807 **APTIC NO. 76933**

Koshi, M.

TRAFFIC STREAM CONTROL AND AIR POLLUTION PREVENTION. *(Kotsuryu kontroru to taiki osen boshi). Text in Japanese. Jidosha Kogyo (Automob. Ind.), 9(5):3-8, May 1975.*

Efforts to diminish exhaust emissions from automobiles by controlling traffic are discussed. Research on actual travelling conditions, exhaust gas levels, fuel consumption, and the time required to travel 1 km was performed. Within the range of 36.7-7.6 km/hr) travelling speed, carbon monoxide, hydrocarbon, and fuel consumption show a linear relationship with travelling time. The relationship between nitrogen oxides and travelling time is not very clear. As a means of controlling the traffic stream, signal-light control must be improved. Control of parking is also important near major intersections. Intersections themselves must be improved to make the traffic current smoother. The regulation of 40 km/hr is not desirable in terms of fuel consumption and CO and HC emissions, although it may contribute to traffic safety. On major highways, when the speed between two spots, including stops, accelerations, decelerations, is 35-40 km/hr, CO, HC and NOx emissions and fuel consumption are closer to the minimum. It is important to establish short- range and long-range controls for trucks, which occupy more than half the travelling mileage, to reduce total traffic demand. A road pricing system, based on distinguishing between types of vehicles, may be helpful in suppressing the use of vehicles within a city.

54808 **APTIC NO. 76970**

Koya, Katsuji, Yuji Watanabe, and Katsuo Hasegawa

PRESSURE CONTROL MECHANISM FOR FUEL SUPPLIER FOR LPG ENGINES. *(LPG kikan no nenryo kyokyu sochi no choatsu kiko). Text in Japanese. (Nissor Motor Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 50-18006. 3p., June 3, 1975. (Appl. Feb. 13, 1971, 1 claim).*

In automobiles driven by LPG, (liquefied petroleum gas), the pressure of the LPG supplied to the engine changes depending upon the temperature. The rise in temperature makes the air concentration low and, on the other hand, the LPG content high, resulting in the discharge of more hydrocarbons and carbon monoxide. According to the apparatus of the present invention, one end on the pressure control spring on the primary diaphragm of the vaporizer is supported by a supporter but not fixed. The supporter is so constructed that it moves corresponding to the movement of a sensor, which moves in proportion to the external temperature. Thus the load applied to the pressure control spring is automatically controlled. Thus the rise of external temperature causes the inner pressure of the LPG tank to rise. This pressure rise causes the primary valve to open causing the pressure control valve spring to receive more pressure. At the point the diaphragm retires until the load on the primary valve spring decreases. Simultaneously, the sensor operates by the rise in external temperature and pushes the supporter to cause the load on the pressure control spring to decrease keeping the primary pressure of the gas constant.

54809 **APTIC NO. 77032**

Koyama, Hajimu and Toshio Yoshida

CONTROL OF NOX BY RECENT IMPROVEMENTS IN BURNER COMBUSTION TECHNOLOGY. *(Saikin no bana nensho gijutsu no kaizen ni yoru NOx no boshi). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(8):703-713, Aug. 1975.*

Three developments in combustion technology to control nitrogen oxides emissions are described. Bias combustion methods (off- stoichiometric combustion), two-stage combustion, exhaust gas recirculation, and combinations of these methods are effective in reducing NOx emissions. Bias combustion utilizes two or more burners. When one flame source is present, bias combustion can be effected, by arranging large and small-diameter jet nozzles alternately, or by arranging different-sized fuel jet nozzles in the space where there had been no flame, to diffuse the flame and effectively utilize the heat-conducting surface. This arrangement (self-bias atomizer) can be repeated for each burner in a set of burners, such as those used in large-scale boilers. Reduction of NOx emissions by 20-40% is easily possible, at 100% boiler loads of 55-240 tons/hr. Two-stage burners divide the air supply for combustion into two or more stages. The first stage air supply furnishes 80-90% of the theoretical amount of air necessary for combustion. Subsequent stages supply the remainder of air necessary for complete combustion. By a combination of self-bias atomizer and two-stage combustion, NOx emission was reduced by 20-50% in an experimental furnace. Exhaust gas recirculation is an effective method of reducing thermal NO formation. When exhaust gas recirculation is used together with self-bias atomizer, NOx emissions were reduced by 15-25%, in a test furnace. A combination of the above three methods resulted in NOx reduction of about 35-50% under optimum conditions.

54810 **APTIC NO. 79527**

Labzova, L. V., N. V. Paramonova, G. S. Andreeva, and M. A. Zharova

FLUE GAS CLEANING IN CHIPBOARD PRODUCTION. *(Ochistka gazovykh vybrosov pri proizvodstve drevesnostruzhechnykh plit). Text in Russian. Plast. Massy, no. 5:23-24, 1975.*

Gaseous emissions generated in the chipboard production process, and methods for flue gas cleaning were studied. As a result of the use of urea-formaldehyde resins, the waste gases emitted in certain technological processes, especially during hot pressing, contain formaldehyde, ammonia, and nitrogen oxides. Air samples from a hot pressing shop contained 65 mg of formaldehyde, 75 mg of ammonia, and 0.03 mg of nitrogen oxides per cu m. The dust concentration was 94 mg/cu m. Experiments with different catalysts under practical conditions revealed that the aluminum-platinum catalyst AP-56 and the palladium catalyst APK-2 are best for the catalytic destruction of formaldehyde and ammonia without nitrogen oxides formation. Dust in concentrations of up to 151 mg/cu m did not interfere with the catalytic process.

54811 **APTIC NO. 79414**

Lewer, Hans

COMBATING DUST BY BINDING WITH CACL2-POWDER USING EXPLOSION OPERATIONS IN MINING. *(Staubbbekaempfung durch Staubbindung mit CaCl2-Pulver bei Sprengarbeit im Bergbau). Text in German. Glueckauf (Essen), 111(9):425-427, 1975. 11 refs.*

A new method for dust emission control during explosion operations in mines by means of calcuim chloride is described. While water spray and water cartridges exploded together with the explosive bind dust effectively, the rapid evaporation of the water particles makes the settled dust particles airborne in a rather short time. Aqueous solutions of hygroscopic salts proved to be considerably more efficient. Hygroscopic calcium chloride packing, with 80% of the particles in the below-0.1 mm fraction, forms a solution with the water vapor, and, once settled, prevents the dust particles from becoming airborne again.

54812 **APTIC NO. 79530**

Macak, Jiri and Vladimir Vcelak

THE USE OF CZECHOSLOVAKIAN SULFUROUS COALS. *(Problematika vyuziti ceskoslovenskych sirnych uhli). Text in Czech. Uhli, 23(1):13-18, Jan. 1975. 67 refs.*

In view of the fact that locally produced brown coal, with a sulfur content up to 16% by weight, will remain the prime source of energy for Czechoslovakia until the year 2030, a review of various coal desulfurization methods is presented in order to evaluate their applicability to the situation existing in Czechoslovakia. Five physical and chemical methods of desulfurization, used prior to, during, and after combustion, and three methods for conversion of coal to synthetic fuel were reviewed. Only a combination of several methods is suitable. Physical methods based on separation by weight and homogenization were found inadequate because of high cost and nonuniform distribution of coal deposits. Classical methods, presently used in Czechoslovakia are also unsuitable. Promising methods include: reduction of coal under pressure to gas, and combined used of combustion chambers and steam turbines, where steam and water can be used for desulfurization. Removal of sulfur in the form of sulfur dioxide is more economical than in the form of hydrogen sulfide. Combustion with desulfurization additives is economical only for small and medium size installations. Fluidization techniques are promising for both desulfurization and efficiency of combustion but relatively undeveloped.

54813 **APTIC NO. 76934**

Maeda, Isamu

A DESULFURIZATION METHOD FOR SINTERING MACHINE EXHAUST GAS BY ACTIVATED CARBON. (Kasseitan ni yoru shoketsu-ki haigasu datsuryu hoho). Text in Japanese. (Sumitomo Shipbuilding and Machinery Co., Ltd. (Japan)) Japan. Pat. Sho 50-15464. 5p., June 5, 1975. (Appl. March 2, 1970, 1 claim).

Based on the characteristics of sulfur oxide and particulate concentrations and temperature of exhaust gas, an efficient desulfurization system for sintering machines was developed. The SO2 concentration at the burner ignition stage is extremely low, 0.03-0.04%, increases rapidly to 0.14-0.16% during the sintering process, and is reduced to 0.03-0.05% toward the end of sintering. The particulate concentration is relatively low, 0.3-0.6 g/N cu m, during the process until it increases rapidly to over 10 g/N cu m toward the end of the interment process. The exhaust gas is di[illegible] using three wind boxes into three groups: (1) extremely [illegible] SO2 and particulate concentrations but high exhaust gas temperature; (2) high SO2 concentration but relatively low particulate concentration and temperature; and (3) low SO2 concentration but relatively high particulate concentration and temperature. The exhaust gas of group (1) is discharged into the atmosphere without any treatment, exhaust gas of group (2) is led to a desulfurization device for the removal of SO2 by adsorption on activated carbon, and exhaust gas of group (3) is led to a dust collector and discharged. The activated carbon powder or dust in the circulatory gas system of adsorption and desulfurization is recovered and recycled as sintering material.

54814 **APTIC NO. 77273**

Maeda, Isamu and Hiromi Tanaka

STACK GAS DESULFURIZATION FACILITY. *(Haigasu no datsuryu sochi). Text in Japanese. (Sumitomo Shipbuilding and Machinery Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-10548. 5p., April 22, 1975. 2 refs. (Appl. July 31, 1970, 1 claim).*

A stack gas desulfurization installation is described which contains one or more pairs of scrubbers, operating alternately and continuously in the adsorption or cleaning cycle. The inlet and outlet for the gas to be treated can be reversed by switching dampers. Within the adsorption-deadsorption vessel, one or more pairs of stationary scrubbers are installed at appropriate distances from each other, with washing nozzles mounted at the tops of these scrubbers. Initially, adsorbent in one of a pair of scrubbers is dampened with spray, and stack gas is passed through this scrubber (I). As the stack gas is dampened by passage through the scrubber, the adsorbent dries out. The dampened stack gas passes through the second scrubber (II) of the pair, and oxides (sulfur dioxide, sulfur trioxide) nearly completely adsorbed by the adsorbent. The purified gas is exhausted into the air. When adsorption capacity decreases, the dampers are switched, and the stack gas is passed through scrubber (II) first, at the same time that (II) is being washed with water by opening the washing nozzles. Dilute sulfuric acid produced in this process is used to regulate concentrations in the manufacture of sulfuric acid. The adsorbent in (II) is dried by the stack gas, while the gas is dampened. Adsorption of sulfur oxides occurs in (I). Adsorbent conditions can be monitored, and the switching operation can be made automatic. Different astructural arrangements are possible for the pairs of scrubbers.

54815 **APTIC NO. 79550**

Mal gin, A. D. and G. A. Rumyantsev

CYCLONE FILTER FOR GAS CLEANING AFTER CLINKER COOLERS. *(Fil tr-tsiklon dlya ochistki gazov posle klinkernykh kholodil nikov). Text in Russian. Tsement, no. 6:10-11, 1975.*

A combined cyclone and gravel filter for dust separation after clinker coolers is described. The gravel filter layer, up to 100 mm in height, is composed of gravels ranging from 2 to 4 mm in size. The waste gas, admitted to the filter at 180-240 C, contains 2 to 5 g of dust per cu m. The flow rate through the gravel layer was varied between 10 and 20 m/sec. The residual dust concentration in the dedusted gas was between 2 and 10 mg/cu m, corresponding to an efficiency of 99.4-99.9%. The hydraulic resistance of the filter layer amounted to 1500-2000 N/sq m. The gravel layer was regenerated by a countercurrent of air at a speed of 20 m/sec.

54816 **APTIC NO. 79574**

Maruoka, Ougyo

FUEL CONTROL DEVICE. *(Nenryo seigyo sochi). Text in Japanese. (Nissan Motor Co., Ltd. (Japan)) Japan. Pat. Sho 50-20202. 2p., July 12, 1975. 1 ref. (Appl. Nov. 17, 1970, 1 claim).*

A fuel control device for an internal combustion engine is described. Gasoline is pumped from the fuel tank to two parallel nozzles through a valve. The first nozzle is located at the upstream side of the carburetor valve. A flapper is equipped near the tip of the second nozzle and the distance is controlled by a set of two torque motors. The amount of gasoline injected from the second nozzle changes when the distance is changed, and the change of the backpressure of the second nozzle, which follows, in turn causes a change of the injection from the first nozzle. The gasoline injected from the second nozzle is collected in a drainage from which it is returned to the fuel tank. The device has the advantages of easy control of the carburetor, no delay of fuel, better continuity, and possible exhaust countermeasure by using lean air-fuel ratio.

54817 **APTIC NO. 79577**

Masaki, Kenji and Shigeji Suzuki

AUTOMATED CONTROLLING DEVICE FOR THE INTAKE AIR TEMPERATURE OF THE INTERNAL COMBUSTION ENGINE. *(Kikan no kyunyu kuki ondo no jido chosetsu sochi). Text in Japanese. (Nisssan Motor Co., Ltd. (Japan)) Japan. Model Util. Sho 50-20175. 2p., June 19, 1975. 3 refs. (Appl. June 9, 1970, 1 claim).*

A device for controlling the intake air temperature of an internal combustion engine at a desired range is described. A shutter is equipped between the air inlet tube of the internal combustion engine and a hot air inlet tube which introduces air heated by the exhaust gas. The shutter is connected to a plunger of a solenoid by two bars and a lever. The solenoid is operated by a heat-sensitive element, a variable circuit, and a bridge circuit. The heat-sensitive element, preferably a semiconducting senser, is equipped downstream of the carburetor. The bar connecting the solenoid and the lever is tugged by a spring. The plunger changes its position against the pulling force of the spring, responding to the change of the magnetic force of the solenoid when the resistance of the bridge circuit is varied. This causes the opening of the shutter and the introduction of hot air into the gas inlet tube.

54818 **APTIC NO. 79301**

Matsuda, T.

POLLUTION FREE INDUSTRY BY ESTABLISHMENT OF POLLUTION CONTROL SYSTEM. *(Kankyo kanri suishin taisei no kakuritsu de mukogaika e). Text in Japanese. Puranto Enjinia (Plant Eng.), 7(2):41-48 Feb. 1975.*

An attempt at the Ishinomaki paper mill to control environmental pollution is described. Desulfurization of stack smoke is by the sulfurous soda method. The gypsum method may also be adopted. Nitrogen oxides are to be treated by waste gas injection and two-stage incineration. Odors from the kraft pulp plant are reduced by keeping odor generating equipment tightly sealed and burning exhaust gas in a lime kiln. A steam stripper for the odorous effluent is also being tested. About 180,000 plastic balls of 10 cm diameter are floated on the surface of a clarifier (45 m diameter) and succeed in suppressing more than 90% of the odor.

54819 **APTIC NO. 77266**

Matsui, Kazuma and Nobuji Kato

CARBURETOR. *(Kikaki). Text in Japanese. (Nippon Denso Co., Ltd., Kariya City (Japan)) Japan. Pat. Sho 50-14298. 6p., May 27, 1975. 2 refs. (Appl. July 13, 1971, 1 claim).*

An improvement in carburetor design is described, whereby decreases in air density (such as from altitude changes) are compensated for so that a constant air-fuel ratio can be maintained. A hollow, rotating cylindrical tube, closed at one end, is attached across the throat of the venturi, and serves as the gas nozzle section. Near the center of the tube, a row of holes along the axis is made, which serve as openings for fuel injection. The closed end of the tube is connected to the rotary mechanism, which is activated by decreases in air pressure. A system of rack, gear, and cam, begins operation upon expansion of the vacuum bellows. Rotation of the tube decreases the amount of fuel furnished, so different air-fuel ratios can be maintained readily, by changing cam shape.

54820 **APTIC NO. 77181**

Mayer, William J., D. C. Lechman, and D. G. Beyerlein

AN ISOTOPE DILUTION METHOD FOR DETERMINATION OF SULFUR ON AUTOMOTIVE EXHAUST GAS CATALYSTS. *Intern. J. Appl. Radiation Isotopes, 26(5):233-236, May 1975. 3 refs.*

An isotope dilution method which employs benzyl disulfide tagged with sulfur-35 is described for the determination of sulfur on automotive exhaust gas catalysts. About 400 microcuries of tagged benzyl disulfide is dissolved in engine oil and used in an operating engine. Catalyst samples are then analyzed periodically during engine operation for total and radioactive sulfur. The percent sulfur deposited on the catalyst from the oil and fuel-air mixture is calculated from the specific gravity of engine oil and catalyst samples. Between 8-12% of the sulfur on catalysts appears to originate from the engine oil. The standard deviation of the method is approximately 10%. (Author abstract modified)

54821 **APTIC NO. 76990**

Meyers, R. A.

DESULFURIZE COAL CHEMICALLY. *Hydrocarbon Process., 54(6):93-95, June 1975. 8 refs.*

A process for desulfurizing coal prior to combustion is described. Thhe process removes up to 80% of the total sulfur content of coal via the chemical leaching of 90-95% of the pyritic sulfur contained in the coal matrix with aqueous ferric sulfate solutions at temperatures of 90-130 C. The ferrous sulfate content of the leach solution is regenerated at similar temperatures using air or oxygen. Elemental sulfur and iron sulfates are recovered as reaction products. The process includes the steps of crushing, chemical treatment, sulfur removal, and solution regeneration. It is most applicable to coals containing pyritic sulfur which currently supply about 60% of the production needs. The chemical leaching process also appears capable of desulfurizing coal reserves which, except for their high sulfur content, can be used as coking coals. The combination of the chemical leaching process with a simplified form of coal liquefaction results in the elimination of the troublesome filtration step in the latter process so that desulfurization is effected by a combination of ferric ion leaching to remove pyritic sulfur and hydrogenation to remove a significant portion of the organic sulfur. Recovery of the solvent is achieved by vaporization.

54822 **APTIC NO. 76927**

Minakami, Tetsuo and Naomichi Tsurumaru

A WASTE GAS DISPOSAL METHOD IN ACETIC ACID PRODUCTION. *(Sakusan deizo doki no haigasu shori hoho). Text in Japanese. (Kuraray Co., Ltd. (Japan)) Japan. Pat. Sho 50-10543. 4p., April 22, 1975. (Appl. April 17, 1970, 1 claim).*

A treatment method for removal of waste gas from acetic acid manufacturing by the catalytic oxidation of C4 hydrocarbons is described. A hundred and fifty ml of ferric, chronic, cupric and aluminum oxides catalysts (atomic ratio Fe:Cr:Cu equals 1:2:5; Al2O3 30%) were placed in the front portion of a reaction tube fitted with an oil jacket, and in the rear portion of the tube were placed 110 ml of platinum (0.2%) on Al2O3. A waste gas containing an 0.8% unreacted butane-butene mixture, 2% carbon monoxide, 0.3% carbonyl compounds, 0.01% acids, 26.5% moisture, 12.5% oxygen, 55.89% nitrogen, and 2% carbon dioxide was introduced at a space velocity of 22,000/hr at a temperature higher than 250 C. The acids, CO, and carbonyl compounds were 100% oxidized, the butane-butene mixture was 99.5% oxidized. No deterioration of the catalysts was observed after 30 days of continuous operation.

54823 **APTIC NO. 79404**

Minamizawa, T.

ENVIRONMENTAL POLLUTION CONTROL OF THE ASPHALT PLANT. *(Asufaruto puranto no kogai taisaku). Text in Japanese. Asufaruto (Asphalt), 18(101):14-17, July 1975.*

Smoke prevention and dust removal at an asphalt plant are reviewed. Asphalt plants emit an average of 30-40 N cu m/kg fuel of waste gas containing up to 300 g/N cu m of dust. The concentrations of moisture, oxygen, and sulfur oxides in the waste gas vary with the moisture content of the aggregate, the amount of combustion, and the temperature. The dusts in the waste gas are fine aggregate which is abrasive and poor in hydrophilicity and cohesion. Bag filters are widely employed in dust collection at asphalt plants. The bag filter generally has a better performance than a wet-type dust collector. The dust concentration in the waste gas can be reduced to less than 0.1 g/N cu m which is far below the present emission standard of 0.8 g/N cu m in general areas and of 0.4 g/N cu m in special areas. Thermal resisting nylon has been developed as a filter cloth with high performance.

54824 **APTIC NO. 79575**

Miyajima, K.

NOX CONTROL MEASURES BY EMISSION GAS CIRCULATING COMBUSTION: EXPERIMENT REPORT OF A SRG-FGR TYPE BURNER. *(Haigasu junkan nensho ni yoru NOx yokusei taisaku: SRG-FGR gata bana no jikken hokoku). Text in Japanese. Kogyo Kanetsu (Ind. Heating), 12(4):255-259, July 1975. 4 refs.*

A self recirculating gasification-flue gas recirculation (SRG-FGR) burner was developed for the prevention of nitrogen oxides emission. A furnace having an inside diameter of 1.7 m, an effective height of 7.1 m, and an effective draft of 7 mm water was used for the test. The SRG-FGR burner was an improved type of a conventional SRG burner. The flue gas was recirculated through a by-pass without pre-mixing with air to prevent destabilizing the flame. At 15% FGR and 20% excess air, the NOx concentrations in the combustion gas could be reduced to 110 ppm with C-oil as fuel and to 35 ppm with LPG (liquefied petroleum gas). The temperature distribution in the furnace was found more homogeneous, but the heat absorption efficiency in the radiation chamber was reduced by 3-5%. The NOx reduction was about 10 ppm as compared to a conventional SRG burner but about 35 ppm for C-oil and 25 ppm for LPG as compared to a Tandem burner.

54825 **APTIC NO. 79352**

Miyamoto, Shosuke

CATALYTIC OXIDATION METHOD OF SULFUR DIOXIDE IN WASTE GAS. *(Haigasu chu ni fukumareru aryusan gasu no sesshoku sanka hoho). Text in Japanese. (Toyo Engineering Co., Ltd. (Japan)) Japan. Pat. Sho 50-21988. 5p., July 26, 1975. 1 ref. (Appl. April 10, 1968, 1 claim).*

A technique for conversion of the sulfur dioxide in waste gas from furnaces, gas turbines, or sulfur-manufacturing processes into anhydrous sulfur trioxide is described. Waste gas containing SO2 was introduced through a rectifier to three consecutive catalyst beds. The dusts in the waste gas either were adsorbed to the surface of the catalyst or mixed with them. The conveyers under the catalyst bed removed parts of the catalysts continuously or at intervals. The dust-containing catalysts were sieved by two sieves of different pore size. The large-size dusts remained on the sieve with larger openings and were removed through a duct. The small-size dusts and small amount of powder catalyst went through the second sieve with small opening. Pressurized gas was used to remove the strongly adsorbed dusts on the surface of the catalyst that remained on the second sieve. The resulting catalyst was resupplied to the catalyst bed. The SO2 in the waste gas was converted to anhydrous SO3 while passing through the catalyst beds. More than 90% conversion was achieved at 430-440 C using a catalyst containing vanadium pentoxide as the major component.

54826 **APTIC NO. 79485**

Mizuno, Kaname

ON WET-TYPE DUST COLLECTORS FOR CUPOLAS. *(Kyupora yo shisshiki shujin sochi ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 43(9):810-816, Sept. 1975.*

Two wet-type dust collectors (steam-venturi and high-steam-venturi), developed by Toho Coke Engineering after 1971, are described. These dust collectors are used to clean and reduce the amount of soot and sulfur oxides in the high temperature flue gases emitted at the cupola. Coarse soot particles are washed and collected at the first-stage dust collector, installed at the top of the cupola furnace. This scrubber also cools the treated gases. Fine soot particles and sulfur oxides are absorbed and removed at the second-stage venturi dust collector. Wash water is circulated through two closed systems, one for the scrubber, and one for the venturi. Exhaust fans of high power are used to draw the gas through the throat of the venturi at high flow rates. Wash water is maintained at a slightly alkaline state. Flue gas enters the scrubber at temperatures ranging from 300-800 C, or higher, but is cooled to 60-80 C, very effectively, by the evaporation of the wash water with which it comes into contact. About 80-90% of total soot is removed by the scrubber. Cross-sectional area of the venturi throat can be varied to suit the needs of the cupola operations. Exhaust fans are engineered to reduce noise. Exhaust gases emitted into the atmosphere at rates of 100-300 cu m/min, contained less than 0.20 g/N cu m of soot, for the steam-venturi dust collector.

54827 **APTIC NO. 79350**

Mizusawa, Takashi, Masaaki Mitearai, and Katsutoyo Watanabe

MANUFACTURING METHOD OF HYDROGENERATION DESULFURIZATION CATALYTIC SUPPORTER. *(Suisoka datsuryo shokubai tantai no seizoho). Text in Japanese. (Sumitomo Metal Mining Co., Ltd. (Japan)) Japan. Pat. Sho 50-22993. 7p., Aug. 4, 1975. 1 ref. (Appl. June 26, 1970, 1 claim).*

This invention relates to the manufacture of a catalyst for hydrodesulfurization of residual oils. Aluminum sulfate (2.0 kg) was dissolved in 1 liter water and was hydrolyzed with 4 N ammonia water at 70 C and pH 8.5. The alumina gel was filtered and washed with 0.1 N ammonia water until its sulfate ion content became less than 0.3 wt%. The resulting alumina was stirred in 5 l ethanol for 20 min and was allowed to stand overnight. The ethanol was decanted and the same operation was repeated 3 times. The alumina contained 10.5 wt% of ethanol. It was molded in a 1.5 mm cylinder and the molded supporter was dried at 120 C and fired at 550 C for 2 hrs. The supporter showed a pore volume of 0.512 cc/g, a specific area of 245.0 sq cm/g and an average pore diameter of 132.1 A. The invention features the impregnation of 2 to 25 wt% of at least one mono-functional or multi-functional alcohol, ketone or carboxylic acid with one to 4 carbon atoms.

54828 **APTIC NO. 79430**

Montagna, Angelo A., Sun W. Chun, and James A. Frayer

ADVANCES IN TECHNOLOGY IN THE DESULPHURISATION OF RESIDUAL OILS. *Preprint, World Petroleum Congress, Tokyo (Japan), Japanese Organizing Committee, 9p., 1975. 15 refs. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

Technological advances in the hydrodesulfurization of residual oils are reviewed. Topics discussed include: the development of coke resistant catalysts, processes for the production of residual fuel oils with sulfur levels as low as 0.1%, residue hydrodesulfurization at low pressures, the hydrodesulfurization of high metal stocks, and middle distillate production from petroleum residues. The application of improved hydrodesulfurization techniques and coke resistant catalysts to residual processing permits the production of residual fuels with sulfur concentrations of between 0.1 and 0.3% from stocks with more than 200 ppm of nickel and vanadium at relatively low pressures. Hydrodesulfurization followed by an improved visbreaking operation allows for the production of middle distillates from petroleum residues. The use of lower pressures in residue hydrodesulfurization results in reduced costs associated with more economical reactor design and lower hydrogen consumption.

54829 **APTIC NO. 77270**

Muramatsu, Nobuhiro, Kosuke Aoki, and Masamichi Miki

SMOKE EXHAUST OR SMOKE BARRIER INSTALLATION. *(Haien matawa boen sochi). Text in Japanese. (Riken Light Metal Industry Co., Ltd., Shizuoka City (Japan)) Japan. Pat. Sho 50-9087. 6p., April 10, 1975. (Appl. April 10, 1972, 2 claims).*

A mechanism is described for opening a square trapdoor in the ceiling for purposes of smoke exhaust, or establishing a smoke barrier. Guide grooves are cut along the opposite inner walls of the outer frame of the door. One end of the door is connected to the outer frame by arms which set in the grooves, and rotate freely to push the door along. The leading edge of the door drops along the wall along a linear path of motion, until the opening is uncovered completely. Friction occurring during the movement of the door prevents the door from dropping so fast that use of shock absorbers becomes necessary. Because the leading edge of the door describes a linear path, there can be a tight fit between the door itself and its frame. Motion of the door is activated by a smoke-sensing device, which releases an electrically operated latch. The door begins to move by its own weight. When the trapdoor cover a large area, such as an entire ceiling, a center beam support with grooves is constructed along the ceiling, so that there are two trapdoors, each of them sliding along guide grooves in the center support beam and the outer frame. Suitable modifications in structure are made to facilitate the motion, and hold the heavy door in place.

54830 **APTIC NO. 79554**

Nagaishi, Isao, Hiroshi Tomoto, Kaoru Sato, Yasuo Omotehara, Tadahiro Azuma, and Fumio Tsujimoto

A STUDY OF THE REDUCTION OF NITROGEN OXIDES EMITTED FROM THE COMBUSTOR. (4TH REPORT). TRIAL PRODUCTION OF THE LOW NOX BURNER APPLYING THE DIVISION-FLAME METHOD. *(Nensho sochi ni okeru chisso sankabutsu teigenka no kenkyu. (Dai 4 po). Bunkatsu kaengata tei NOx bana no shisaku). Text in Japanese. Osaka-Furitsu Kogyo Gijutsu Kenkyusho Hokoku (Osaka Prefect. Res. Inst. Ind. Technol. Rep.), no. 66:19-24, July 1975. 4 refs.*

For the reduction of nitrogen oxide emission, a low NOx burner for two-stage combustion was developed using flame divider in the secondary combustion region designed to reduce flame temperature. As for the primary combustion region, the structure, dimension and fuel injection method are the same as those of the two-stage combustion burner described in the previous report. In the secondary combustion region, a secondary air intake pipe with a funnel shaped opening is placed and a flame divider is placed over the air intake port. Using five types of flame divider, five burners were produced and tested for their NOx reduction efficiency. The NOx reduction rate of flame divider type burner was higher than that of the two-stage combustion burner reported previously. For example, at optimum combustion conditions with fuel injection rate of 14-16 hr, 40-50% air ratio to the theoretical amount of air in the primary combustion region, residual oxygen concentration in exhaust gas at less than 2% and exhaust gas temperature at lower than 700 C, the NOx emission concentration was about 40 ppm, which represented the reduction to 1/3 of the ordinary burner. The fact that this burner can be installed without major remodeling of furnace structure and its high efficiency for NOx reduction are advantages from the standpoint of practical application.

54831 **APTIC NO. 79556**

Nagata, K.

NOX CONTROLLING MEASURES BY COMBUSTION TECHNIQUE. *(Nensho gijutsu ni yoru NOx yokusei taisaku). Text in Japanese. Kogyo Kanetsu (Ind. Heating), 12(5):323-368, Sept. 1975. 13 refs.*

A general discussion is given on nitrogen oxides prevention techniques. A mix-promoting burner allows the fuel and the air to collide at right angles for better and faster mixing. The resulting conical, thin flame gives greater heat evolution and shorter time of residence, which results in the reduction of the thermal NOx. A flame partition burner divides the flame into a number of small flames to reduce both the flame temperature and residence time. A vapor-injection flame partition burner greatly reduces the NOx concentration and particulates concentration. A self recirculation gasification method employs high speed gas injection to cause combustion gas recirculation, resulting in the reduction of the oxygen concentration in the recirculation region as well as the promotion of gasification. The use of emulsion fuel by mixing water with fuel results in the reduction of NOx emission due to the decrease of combustion temperature and the well-dispersed fuel particles. The combination of more than one of the combustion techniques further reduces the NOx emission significantly.

54832 **APTIC NO. 79578**

Nakamura, Tatsuo, Hiroaki Sakanaka, Soji Mizuno, and Toshiyuki Nakagawa

AIR CLEANER FOR INTERNAL COMBUSTION ENGINE. *(Nainen-kikan no ea kurina). Text in Japanese. (Kubota Ltd. (Japan)) Japan. Model Util. Sho 50-20174. 3p., June 19, 1975. 1 ref. (Appl. May 29, 1970, 1 claim).*

Improvements of air cleaners for internal combustion engines are described. Exhaust gas containing dusts is introduced through a gas inlet to a number of cyclone blades which convert the gas flow into a swirling motion. The dusts are separated from the gas by centrifugal force and are collected after being allowed to drop through the edges of a wooden bowl. The resulting gas passes through the bottom half of an element where the remaining dusts are filtered. The element can be put in an inverse position so that the upper half can be used for the same purpose. Large particles are removed by the centrifugal force caused by the cyclone blades so that there is no clogging at the element.

54833 **APTIC NO. 77265**

Nakamura, Yuichi and Tadahiko Ito

HEATING METHOD FOR FUEL MIXTURE IN INTERNAL COMBUSTION ENGINE. *(Nainen kikan no nenryo kongoki kanetsu hoho). Text in Japanese. (Mitsubishi Motors Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-14288. 4p., May 27, 1975. (Appl. May 8, 1971, 2 claims).*

Hot exhaust gas from an automobile internal combustion engine is passed through a catalytic converter, then used to heat the fuel mixture for the engine before being expelled through the exhaust, to improve combustion and shorten warmup time. Purified exhaust gas is used during warmup to heat the riser section of the air intake manifold, located directly under the carburetor. A control valve, operated by a bimetallic strip, is located near the outlet to the catalytic converter. Until the desired high temperature of exhaust gas is reached after the engine is activated, the control valve remains closed, and the purified exhaust gas is recirculated, to warm the riser section through its external walls, before expulsion into the atmosphere. When the warming action of the exhaust becomes unnecessary, the control valve remains open, and the purified exhaust gas is expelled directly into the air. Action of the control valve can also be initiated by time lapse after startup of the engine, and the valve itself can be one which directly blocks the entrance to the recirculation tube as well as the exhaust pipe.

54834 **APTIC NO. 76967**

Nakashima, Yasuo and Yoshimasa Hayashi

DISCHARGED-GAS CLEANERS FOR AUTOMOBILES BY MEANS OF THE COMBUSTION IN CYLINDERS. *(Kito nai no nensho o riyoshita jidosha yo enjin no haiki joka sochi). Text in Japanese. (Nissan Motor Co., Ltd., Yokohama (Japan)) Japan. Model Util. Sho 50-19041. 4p., June 10, 1975. 2 refs. (Appl. July 30, 1969, 1 claim).*

For the prevention of environmental pollution, carbon monoxide and hydrocarbons were oxidized in engine cylinders by holding the gas to be discharged for some time in the cylinder at high temperature and high pressure while the car is running in cities, where the pollution problem is the most serious. This method is superior to the recombustion of discharged gas in exhaust tubes because both the temperature and pressure are high in engine cylinders. Up until now, the timing of the cam for discharged gas has been delayed to practice the method. However, this method was accompanied by the disadvantage that the efficiency of the engine falls and that the combustion is incomplete unless the delay of the cam opening was very large. The present invention adopts both the delay of the cam opening and the decrease of the lift distance of the exhaust valve within a definite region of operation of gasoline engines. This idea was embodied by the use of 2 cams. One cam is used for running in the suburbs under ordinary conditions and the other is used for running in the cities with less exhaust of harmful gases.

54835 **APTIC NO. 77033**

Narisoko, Minoru

NOX REDUCTION BY IMPROVEMENTS IN BOILER CONSTRUCTION AND COMBUSTION. *(Boira kozo to nensho no kaizen ni yoru NOx teigen). Text in Japanese. (Nenryo Oyobi Nensho (Fuel and Combustion), 42(8):684-702, Aug. 1975. 15 refs.*

Formation, suppression, and reduction of nitrogen oxides in boilers are reviewed, with reference to measures taken at the Ishikawajima Harima Heavy Industries Co., Ltd., Japan. Off-stoichiometric combustion technology was developed to reduce NOx emissions. Emissions of NOx were reduced by 10-40%, when off-stoichiometric combustion was used in conjunction with other processes (exhaust gas recirculation, two-stage combustion, addition of water). Improvement in burner tip design for off-stoichiometric combustion consists of using variable wings called intervanes to give the air a rotary motion before its introduction into the burner slot. Improved mixing with the injected fuel occurs, and the burner can be used for natural gas, liquid petroleum fuel, and fine coal dust. The combination of intervane burner and a separate windbox in a boiler resulted in stable, effective combustion, even when oxygen concentrations in exhaust gas ranged from 0.3-0.5%. At Ishikawajima Harima Heavy Industries, naphtha-burning and natural gas-burning boilers are in operation, and testing is under way to use methanol and SNG (synthetic natural gas) as other boiler fuels which are low in fuel nitrogen content.

54836 **APTIC NO. 79412**

Nishiyama, K. and S. Kobayashi

SUCCESSFUL EXPERIMENT ON ENERGY SAVING AND NITROGEN OXIDES REDUCTION BY MIXED COMBUSTION OF OIL AND WATER. *(Abura to mizu o konsho shite sho-enerugi to NOx teigen ni seiko). Text in Japanese. Kinzoku (Metals) (Tokyo), 45(10):33-37, Oct. 1975.*

An oil-water mixing device for existing boiler systems was developed, based on the successful energy conservation and nitrogen oxides reduction obtained with oil-water emulsion combustion using a 300 kg/hr experimental boiler and a 5 t water boiler. The mixing ratio of water is controlled automatically, and the device is placed in a by-pass between the service tank and burners. No reduction in boiler efficiency was observed up to a water mixing ratio of 25%, which indicated substantial savings in fuel. By varying the mixing ratio of water, 30-50% reduction in NOx emission was achieved without increase in fuel consumption. The mixing ratio of water varies with furnace structure, temperature and other combustion conditions. In the case of combustors with a set air ratio (not adjustable) or with low furnace temperature, fuel savings cannot be expected.

54837 **APTIC NO. 79045**

North, A. A.

ODOUR SUPPRESSION. *Warren Spring Lab., Stevenage (England), Air Pollution Div., Prev. Pollut. Role Ind. Conf., London, England, 1975, p. 20-24. 8 refs. (March 12-13, Paper 7.)*

Air pollution problems resulting from odorous emissions are discussed. Topics covered include: sources of odorous emissions (rendering processes, farming operations, food and feed processing, chemical processing, sewage and refuse disposal); odor measurement techniques; and odor abatement methods (condensation, scrubbing, adsorption, thermal and catalytic oxidation, odor counteraction, and chemical oxidation). Investigations on odor measurement and control being conducted by the Warren Spring Laboratory are outlined.

54838 **APTIC NO. 77271**

Nozaki, Yukio, Hiroshi Abe, Tomonori Kato, Keijiro Hirahama, and Yasumura Hosaka

A COMBUSTION DISPOSAL METHOD FOR AMMONIA GAS IN COKE OVEN GAS. *(Kokusu-ro gasuchu no anmonia gasu nensho shori hoho). Text in Japanese. (Nippon Kokan Kabushiki Kaisha, Tokyo (Japan)) Japan. Pat. Sho 50-15462. 4p., June 5, 1975. 2 refs. (Appl. June 22, 1970, 1 claim).*

Ammonia in coke oven gas is absorbed in water or very dilute aqueous solution of ammonia, distilled in the form of ammonia gas containing steam, and burned in the temperature range of 1150 + or - 150 C, with admixture of coke oven gas, with controlled emission of nitrogen oxides. There is a correlation between the combustion temperature and the amount (ppm) of nitrogen oxides in the waste gas after combustion. For obtaining emission concentrations of nitrogen oxides of 100 ppm, a maximum temperature of 1188 C, minimum temperature of 1110 C, and intermediate temperature of 1148 C, are possible. The combustion temperature of ammonia gas can be varied to obtain desired emission concentrations of nitrogen oxides. A high degree of heat recovery is possible from the combustion process. The concentration of ammonia in the distillate for combustion (stripping gas) can range from 10-20 volume%. A flow sheet for the process and graph of correlation between combustion temperature and emission concentrations of nitrogen oxides are included.

54839 **APTIC NO. 79429**

Oblaender, K. and H. G. Schmidt

INFLUENCE OF ENGINE DESIGN AND FUEL QUALITY ON DIESEL EMISSIONS. I: ENGINE DESIGN. *Preprint, World Petroleum Congress, Tokyo (Japan), Japanese Organizing Committee, 8p., 1975. (Presented at the World Petroleum Congress, 9th, Tokyo, Japan, May 11-16, 1975.)*

Engine design variables affecting exhaust emissions from light-duty diesel-powered motor vehicles are discussed. Divided chamber engines are superior to direct injection engines in terms of exhaust emission reduction for light-duty applications. Swirl- chamber systems demonstrate hydrocarbon exhaust levels that are slightly below the future 0.41 g/mi standard, while prechamber engine designs reduce hydrocarbon levels to about half the standard. Prechamber engines are slightly better than swirl- chamber engines in terms of carbon monoxide emission levels, although the swirl-chamber design is slightly superior with respect to nitrogen oxide emissions. Erratic late fuel injections which produce noxious emissions can be reduced by integrating reverse flow damping valves into the injection lines at the injection pump. Nitrogen oxide emissions from diesel engines can be further reduced by the use of exhaust gas recirculation; this method, however, is limited by concurrent increases in hydrocarbons, CO, and smoke. Sulfur dioxide emissions from diesel engines are negligible.

54840 **APTIC NO. 79337**

Oelert, Hans-Henning, Gerhard Woschni and Joachim Zajontz

OXIDES OF NITROGEN EMISSIONS FROM COMBUSTION ENGINES. *(Stickstoffoxide-Emissionen aus Verbrennungskraftmaschinen) Text in German. Staub, Reinhaultung. Luft, 35(4):138-142, 1975.*

The mechanism of nitrogen oxides formation in internal combustion engines, and possibilities for their reduction or destruction are described. As the nitrogen oxides formation is determined primarily by the peak temperature of the combustion reaction, all possibilities available for the abatement of nitrogen oxides formation can be reduced to a reduction of the peak temperature. Such a reduction is possible by retarded ignition in spark- ignition engines, and by advancement of the start of delivery in diesel engines. Partial exhaust gas recirculation, or the addition of water to the fuel or to the combustion air are also efficient in spark-ignition engines. These measures require, however, improved fuel distribution to prevent the excessive increase of other emissions, and the excessive reduction of efficiency. Once formed, nitrogen oxides can be reduced to nitrogen and oxygen by means of reducting catalytic afterburners, precious metals, metal oxides, such as nickel and copper oxides, or copper-chromite catalysts.

54841 **APTIC NO. 79487**

Ohshida, Syozo

ENVIRONMENTAL ASSESSMENT CONCERNING SULFUR OXIDES, AND COUNTERMEASURES TAKEN BY KASHIMA OIL CO. *(Io sankabutsu ni kakawaru kankyo asesumento to Kashima Sekiyu no taiosaku). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(9):769-779, Sept. 1975. 3 refs.*

Measures taken by Kashima Oil Co., located in the Kashima Coastal Industrial Region, Japan, to reduce pollution by sulfur oxides are described. When pollution warnings are issued, conversion to low sulfur fuel (0.25% sulfur content) is initiated. About 60% of total fuel production by Kashima Oil is consumed by the other industries in the complex. Currently, about 75% desulfurization is effected on the fuel. By 1976, all raw materials should be of low sulfur content (0.25% sulfur). Tail gas, containing sulfur dioxide and hydrogen sulfide, is treated by reduction with hydrogen (Scott process), or by oxidation (Wellman Lord process), to obtain sulfur as the final product. Kashima Oil Refinery possesses sulfur recovery capacity of

420 t/d, which is more than 8.3% of the national capacity. If this sulfur is released into the air, rate of emission of sulfur dioxide would be 367.5 N cu m/hr. To survey the factory area, an environmental monitoring system with a computer has been set up. In addition to factory operations, such factors as water quality, noise, odor, and weather conditions are regularly checked. A large-scale denitrification plant (50,000 N cu m/hr) is under construction.

54842 **APTIC NO. 77202**

Ohya, Kimihiko, Tateo Sugimoto, and Akie Tsuruizumi

ANALYSIS OF THE OVERALL SUBSTANCE TRANSFER COEFFICIENT IN THE ADSORPTION OF SULFUR DIOXIDE. *(Nisanka io no kyuchaku ni okeru sokatsu busshitsu ido keisu no kaiseki). Text in Japanese. Preprint, Chemical Society, of Japan, Hokkaido Branch, Hokkaido (Japan) p. 64, 1975. (Presented at Chemical Society of Japan, Hokkaido Branch, Summer Lecture Meeting, Hokkaido, Japan, July 26, 1975.)*

In order to analyze the overall material transfer coefficient of an air-sulfur dioxide system, spherical glass beads were used as non-porous adsorbents, and activated charcoal and porous glass were used as porous adsorbents. The adsorbent gas was drawn from the bottom of a transparent acryl resin and glass columns of 26 mm and 10 mm inner diameters, respectively, from 40-280 mm in height. The gas concentration at the inlet and outlet was tested by the impinger method. Corpuscular Reynolds counters varied 0.1-70. The non-porous glass beads were of 0.14 mm, the crevices between beads being considered greater than the average free passage of air-SO2, so that adsorption speed depended mainly on border membrane diffusion. The diffusion model of activated coal into small holes was presumed to be non-constant Knudsen diffusion. According the the Knudsen diffusion equation, diffusion ratio and diffusion coefficient, Di, were sought. The maze coefficient of porous materials was set at 4.1, and effective diffusion coefficient, De, was sought. The effective diffusion coefficient was in the order of spherical glass beads, porous glass, and activated charcoal. The ratio of diffusion coefficient and effective diffusion coefficient (Di/De) was 4. It was found that activated coal had a better adsorption capacity compared with porous glass, and was not easily affected by corpuscular Reynolds counters.

54843 **APTIC NO. 79573**

Otsubo, Jo

EXHAUST GAS CIRCULATION DEVICE. *(Haiki kanryu sochi). Text in Japanese. (Nissan Motor Co., Ltd. (Japan)) Japan. Pat. Sho 50-18527. 3p., June 30, 1975. (Appl. March 19, 1971, 1 claim).*

An invention related to the exhaust circulation from one cylinder to another for recombustion is described. The cylinders of a 4-cylinder engine are arranged in such a way that the 1st and 4th cylinders and the 2nd and the 3rd cylinders are each connected with a gas duct. The point that connects the gas duct and the cylinder is located below the top ring which is on the upper dead point of the piston. When one cylinder is in an expansion stroke, the exhaust gas is pushed to the other cylinder of the pair through the gas duct. The gas ducts are arranged in such a way that a strong vortex is formed while the combustion occurs. The device is applicable to engines with more than 4 cylinders.

54844 **APTIC NO. 76932**

Otsuki Tatsukiyo

CATALYST FOR AMMONIA CATALYTIC REDUCTION AND ITS EQUIPMENT. *(Anmonia seshoku kangen shokubai to sono sochi). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(8): 733-744, Aug. 1975.*

A description of the Santetsu ammonia reduction catalyst developed for flue gas denitrification is given with performance test results. Using a catalyst consisting primarily of ferric oxide, the effects of reaction temperature, amount of NH3 added, coexisting substances (sulfur oxides, water) and space velocity on the denitrification rate were tested. The results of denitrification carried out at several test plants are also given with a description of denitrification systems and reaction conditions. A denitrification rate of 85-95% was readily attained by adjusting reaction conditions (e.g., space velocity 5000/hr, reaction temperature 300-500 C and above 400 C in the presence of SOx, NH3/nitrogen oxides molar ratio less than 1.0). The durability of the catalyst is sufficient, since it is resistant to acidic gases such as sulfur dioxide, sulfur trioxide, hydrogen chloride, and hydrogen fluoride and the problem of catalyst clogging by particulate matter is solved by molding the catalyst into hollow cylinders of 17-55 mm (outside diamater) by 35-5 mm (inside diameter) by 15-10 mm (length). The cost of the catalyst and total cost for the denitrification operation are in the economically feasible range.

54845 **APTIC NO. 77269**

Ouchi, Hideo

EXPLORING MECHANISMS FOR LOW-POLLUTION CARS: TECHNOLOGY FROM VARIOUS AUTOMAKERS TO COPE WITH 1976 REGULATIONS. *(Teikogaisha no mekanizumu o saguru: 51-Nendo kisei ni taio suru kakusha no gijutsu). Text in Japanese. MOL, 13(7):25-32, July 1975. 3 refs.*

Automotive exhaust emissions, regulations, and countermeasures are discussed. Emission sources of automobile pollutants are the engine exhaust pipe, crankcase, and fuel supply system, and consist of carbon monoxide (CO), hydrocarbon (HC), nitrogen oxides (NOx), sulfur oxides (SOx), and particulate matter. Current regulations deal only with emissions/distance (g/km). Amount of exhaust varies with the mode of running the car. Under 10-mode conditions, 1976 emission standards (g/km) are as follows: CO (average, 2.1; permissible limit, 2.7); HC (average, 0.25; permissible limit, 0.39); NOx (average, 0.60 or 0.85; permissible limit, 0.84 or 1.20). In 1978, the proposed average emission standards for NOx are to be 0.25 g/km. Technology for control of crankcase gas (blowby gas) emissions and fuel evaporation, such as adsorption of evaporated gas on activated carbon, and use of PCV valves, are well-developed. Methods of controlling exhaust gas emissions include simple engine modifications, and redesigned engines (rotary engines, compound vortex controlled combustion (CVCC)), exhaust gas recirculation, thermal reactor, afterburner, catalytic converter.

54846 **APTIC NO. 77071**

Pedroso, Roberto I. and William J. Osborne

A COMMERCIALLY PROVEN SOLUTION FOR POWER PLANT FLUE GAS DESULFURIZATION. THE WELLMAN-LORD SO2 RECOVERY PROCESS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-48.4.)*

Advantages of the Wellman-Lord sulfur dioxide scrubbing process are outlined. The process operates on a sodium sulfite/bisulfite cycle. As sodium sulfite absorbs SO2 and forms sodium bisulfite, the solution becomes less saturated; thus scaling and plugging problems do not arise. The SO2 removal system can operate even if the regeneration section is closed down for maintenance, giving the process a high on-stream factor. Another advantage of the process is that it produces a marketable end-product such as concentrated sulfuric acid or elemental sulfur. The process is being commercially used at 10 installations in the United States and Japan, representing an aggregate operating time of more than 30 yr. Descriptions of several commercial installations and their operating experience is included with capital cost estimates and other economic data. (Author abstract modified)

54847 **APTIC NO. 77262**

Phipps, J. N.

ENVIRONMENTAL PROBLEMS INSIDE AND OUTSIDE THE DYEING AND FINISHING WORKS. *Intern. Dyer, Text. Printer, Bleacher Finish., 153(11):563-566, 568, 570, 573, May 30, 1975. 3 refs.*

Not only emissions but also maintenance and condensation problems are discussed. Methods of dealing with odor pollution include using fans to dilute the substance, oxidizing odor pollutants in a flame, counterflow washing and chemical reodorization. Use of less dye carrier in recent years has resulted in lowering odor pollution and emissions. Emissions from stenter drying machines can be controlled by a liquid scrubbing device, by incineration, or by catalytic combustion. Incineration involves heating the exhaust gases to a temperature of 750 C for 1 sec. Catalytic combustion involves preheating the exhaust gases and passing them over the catalyst. A heat-exchanger is sometimes used. Catalytic combustion is the most practical emission control technique. Electrostatic precipitators with prescrubbing may also be used, but their long-term reliability is yet to be proved.

54848 **APTIC NO. 79202**

Prahacs, Steven

A NEW TECHNIQUE FOR CONTROLLING HYDROGEN SULPHIDE EMISSIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 8 refs. (Presented at the Air Pollution Control Association, Quebec Section, Conference on Strategy for Air Pollution Management, St. Jovite, Quebec, May 25-27, 1975.)*

Laboratory and pilot plant studies of a technique for controlling hydrogen sulfide and mercaptan emissions from kraft pulping operations are reported. The technique is based on the use of alkaline suspensions of powdered activated carbon as a scrubbing agent. Pilot plant studies using a turbulent contact absorber demonstrated removal efficiencies of more than 99 and 95% for H_2S inlet concentrations of 400 and 1000 ppm, respectively. Carbon dosages of less than or equal to 0.5 lb/ton of pulp were found satisfactory. Pilot tests with a cross-flow scrubber revealed outlet concentrations of total reduced sulfur compounds ranging from 2-13 ppm for inlet concentrations of 150-2300 ppm.

54849 **APTIC NO. 77172**

Rains, Dean A.

PROSPECTS IN NAVAL GAS TURBINE POWER PLANT MACHINERY. *Nav. Engr. J., 87(2):126-138, April 1975. 10 refs.*

Prospects for improved gas turbine naval power plant technology are described. Topics discussed include: new high performance gas turbine engines, machinery maintenance monitoring techniques, improved propulsors, advanced speed control and speed reduction devices, combined cycle plants (gas/steam), new fuels, improved anti-icing techniques, and superconducting electric drive machinery. Liquid hydrogen is cited as an alternative to oil with long range potential. It possesses the advantages of being produced from coal or by electrolysis of water, having no obnoxious exhaust products, and allowing for a longer gas turbine engine life.

54850 **APTIC NO. 79513**

Rajska-Stolarczyk, Jadwiga and Jaropelk Zyzniewski

NEW LACQUER PRODUCTS FOR THE PROTECTION OF BUILDING ELEMENTS AGAINST CORROSION. *(Nowe wyroby lakierowe do zabezpieczenia przed korozja elementow budowlanych). Text in Polish. Ochr. Koroz., no. 5:156-158, May 1975.*

Methods of protecting building materials from corrosion are presented. Recently developed substances in this field include emulsive acrylic masses for plastering the outer walls of medium and large-size prefabs. Acrylics have been applied in many building projects as a surface layer in the thermal engineering of external walls. Laboratory evaluation of the quality of the acrylic plastering mass demonstrates that the substances are resistant to the alkalinity of base materials, provide elastic coats resistant to changing environmental conditions, possess good hardness, outstanding adhesiveness, and great resistance to mechanical abrasion. Acrylic emulsive masses consist of a suspension of mineral fillers and pigments in arcylo-styrene latex to which water and adjunct agents are added. They are used to finish building elements and directly on building sites, are characterized by a delicate smell, and are non-toxic and non-flammable. They also display a great adhesiveness to fresh bases (alkaline and wet), as proved in tear-off tests with concrete. The Baronne hammer impact test and waterproof tests gave good results. They exhibit resistance to atmospheric factors (tested in a climate chamber). Repairs of concrete surfaces covered with the acrylic plastering coat could be easily performed by applying a polymer-cement speckling substance on which a thin layer (1 mm) of the mass is placed.

54851 **APTIC NO. 79521**

Razdol kina, V. I. and V. K. Leonenko

FLUE GAS CLEANING IN STYRENE PRODUCTION AND PROCESSING. *(Sanitarnaya ochistka otkhodyashchikh gazov pri poluchenii i pererabotke stirola). Text in Russian. Plast. Massy, no. 5:22-23, 1975. 4 refs.*

Aluminum-platinum catalyst AP-56, copper-chromium catalyst GIPKh-105, manganese ore, and zinc-chromium catalyst were tested for their suitability for the catalytic oxidation of styrene and alpha-methylstyrene as generated during the production and processing of styrene in plastic materials production. The waste gases to be purified are preheated by means of a natural gas firing to 380-400 C before they are admitted to the catalytic chamber. While all catalysts were suitable for this purpose, the aluminum-platinum catalyst AP-56 and the copper-chromium catalyst GIPKh-105 were best as they ensured complete oxidation to water vapor and carbon dioxide.

54852 **APTIC NO. 79496**

Richardson, Ian M. J. and John P. O Connell

SOME GENERALIZATIONS ABOUT PROCESSES TO ABSORB ACID GASES AND MERCAPTANS. *Ind. Eng. Chem., 14(4):467-470, Oct. 1975. 12 refs.*

Pearson s categories of hard and soft acids and bases can be applied to the chemicals involved in processes for absorbing the acid gases hydrogen sulfide, carbon dioxide, mercaptans, carbonyl sulfide, and carbon disulfide to rationalize the different levels of removal presently obtained. Although the hard and soft acid base generalizations are overly simplistic and without further development cannot be quantified to the point of predicting effective activity coefficients, they do classify the processes in a consistent pattern and could be helpful for screening new absorbents and oxidants for potential use in removing acid gas impurities of fluid hydrocarbons. (Author abstract modified)

54853 **APTIC NO. 77264**

Saito, Hirotake

CARBURETOR-AUTOCHOKE APPARATUS FOR INTERNAL COMBUSTION ENGINE. *(Nainen kikan no kyabureta-otochoku sochi). Text in Japanese. (Mitsubishi Motors Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-14690. 6p., May 29, 1975. 3 refs. (Appl. May 22, 1971, 1 claim).*

Improvement in autochoke operation is described, for an autochoke setup in which choke valve operation is controlled by heating a bimetallic strip with exhaust gas or radiator water. An electrical heating unit is used additionally to heat the bimetal, to speed up opening of the choke valve upon completion of the explosion when the engine has warmed up to a set temperature. The electrical heating circuit includes a thermistor, which senses the warmup condition of the engine, and a generator, which senses the progress of the explosion, by changes in generated voltage. A sensor of manifold negative pressure can also be used to determine progress of the explosion. A timer acts to close the transistor switch in the heating circuit, when signals from the ignition switch, thermistor, and generator coincide. The bimetal is heated, and choke valve opens readily. The heating unit operates only at predetermined temperature ranges, and the usual choke valve operations by radiator water or exhaust gas are in effect otherwise.

54854 **APTIC NO. 76969**

Saito, Kunihiro

PREVENTION MECHANISMS OF POLLUTION BY THE GASES DISCHARGED FROM 2-STROKE ENGINES. *(2 saikuru engin no haiki no yoru osen boshi sochi). Text in Japanese. (Kawasaki Heavy Industries, Ltd., Kanagasa (Japan)) Japan. Model Util. Sho 50-14023. 2p., April 30, 1975. (Appl. Nov. 13, 1968, 1 claim).*

The dispersion of oil drops from the discharge tube of motorcycles is very troublesome because it soils clothes and the body of the motorcycle. This dispersion of oil drops is prevented by the present invention, which makes use of an apparatus consisting of a tank which is installed at the rear end of the muffler and which separates and arrests the oil drops. the flow of discharged gas is bent upward and sideways by this apparatus which is attached or welded to the rear end of the discharge tube. The gas from the discharge tube is made to impact a protector plate which is kept perpendicular to the axis of the exhaust pipe and which removes the oil drops. The discharged gas then flows sideways and is then forced to make a spiral movement around the axis of the discharge tube. Thus the oil drops are again removed from the main body of the discharged gas. At the lower end of the apparatus a small pool is present to retain the oil.

54855 **APTIC NO. 79483**

Saito, Toshio

REALITIES OF FLUE GAS DESULFURIZATION BY SODIUM SULFITE METHOD. *(Aryuso ho ni yoru haien datsuryu no jissai). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(9):803-809, Sept. 1975.*

Two kinds of flue gas desulfurization units, in operation at Daicel Ltd., Japan, are described. For small-scale boilers, an installation (40,000 N cu m/hr) utilizing the sodium sulfite- sodium sulfate method is used. For medium to large-type boilers, an installation (200,000 N cu m/hr) utilizing the sodium sulfite-gypsum method is used. Sulfur dioxide (SO2) in the flue gas is absorbed by sodium sulfite; resultant sodium bisulfite is neutralized by sodium hydroxide or calcium carbonate. Resultant products are oxidized with oxygen to sodium sulfate or calcium sulfate. Advantages are: Quick absorption of sulfur dioxide by sodium sulfite; lack of scale formation in the absorption tower; advantageous spatial arrangement of the unit, because absorption and gypsum processing can be separated into two non-adjacent units. The flow rate of gas is 2 m/sec; pressure loss in the absorption tower is 50 mm Aq. In a boiler (200 ton/hr) the liquid/gas ratio is 1.5 l/cu m; pump power is 75 kW. Over 95% absorption of sodium dioxide occurred in the unit (200,000 N cu m/hr), even at a pH of 6.4 in the absorption liquid. A high deg of corrosion resistance is necessary in the materials used in the cooling equipment for boiler exhaust gas. The system is not completely closed; some waste water is emitted.

54856 **APTIC NO. 79555**

Sano, Hiroshi and Hiromasa Ogawa

PREPARATION AND APPLICATION OF NITRIFIED ACTIVATED CARBON (II). APPLICATION FOR REMOVAL OF SULFUR OXIDES FROM FLUE GAS. *(Chissoka kasseitan no seizo to sono oyo (Dai 2 ho). Haien datsuryu eno riyo). Text in Japanese. Osaka Kogyo Gijutsu Shikenjo Kiho (Bull. Gov. Ind. Res. Inst., Osaka), 26(2):92-96, June 1975. 8 refs.*

The application of nitrified activated carbon to desulfurization of flue gas was investigated by measuring the variation in absorption weight of sulfur oxide with time, sulfur dioxide specific absorption variation with nitrogen content, and SO2 specific absorption variation with basic site quantity. In the case of using nitrified activated carbons containing 0.35-3.81% of N, the absorption weight of SO2 showed a linear relationship within 5 hr of absorption time, and was from about 1.2-1.7 times higher than in the case of untreated activated carbon. The SO2 specific absorption showed a general tendency of increase with the increase in N content but not always proportional to the N content, and a linear increase with the increase in basic site quantity. However, the increase in basic site quantity did not necessarily correspond to the increase in N content. The effect of the regeneration method (desorption by water washing and desorption by heating) on the life of nitrified activated carbons was also investigated. With the heating regeneration, the SO2 absorbability deteriorated more readily at higher N content. In this case, the basic site quantity was decreased markedly, though little decrease was observed in N content. It was presumed that only a part of the N site is effective for absorbing SO2 and basic functional groups played an important role in absorption.

54857 **APTIC NO. 79306**

Sawada, H. and S. Ohnishi

THE ENVIRONMENTAL POLLUTION CONTROL EQUIPMENT INSTALLED AT THERMAL-POWER STATION. *(Karyoku hatsudensho de katsuyaku suru kogai boshi kiki). Text in Japanese. Shin Denki (New Electr.), 29(8):34-39, July 1975.*

Various air pollution control measures taken by thermal power stationss including electrostatic precipitators, flue gas desulfurization, and nitrogen oxides emission control methods including flue gas denitrification are reviewed. The amount of dust in boiler exhaust gas is 100-300 mg/N cu m, and electrostatic precipitators are the most commonly used control device. The principle, structure, and function of electrostatic precipitators are described with their characteristics. Desulfurization methods are classified according to their reaction process. The sodium sulfite - gypsum system developed jointly by Kawasaki Heavy Industry and Kureha Chemical Co. is discussed with descritpions of reaction processes and function and structure of the system. Nitrogen oxides control methods described include exhaust gas recirculation, multi-stage combustion, and prompt combustion. Denitrification methods discussed include the wet method (absorption method and reduction method) and the dry method, in which NOx is selectively reduced to nitrogen gas using ammonia or hydrogen sulfide as reducing agent.

54858 **APTIC NO. 77279**

Selle, Stanley J., Lindsay L. Hess, and Everett A. Sondreal

WESTERN FLY ASH COMPOSITION AS AN INDICATOR OF RESISTIVITY AND PILOT ESP REMOVAL EFFICIENCY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-02.5.)*

Pilot-scale electrostatic precipitator performance tests were run on a high and low resistivity western fly ash and mixtures thereof. The fly ashes were collected from full-scale electrostatic precipitator hoppers and reentrained in a flue gas of constant analysis ahead of a 120 standard cu ft/min pilot precipitator. Fly ash composition and measured resistivity were good indicators of precipitator performance. Reentrained high-sodium fly ash acted as an electrostatic precipitator conditioning agent for high- resistivity fly ash. The addition of only 0.75% of the high- sodium fly ash increased the effective migration velocity from 0.5 to 0.8 ft/sec at 300 F. Similar results were obtained at 475 F. Computer regression analysis correlating laboratory fly ash resistivity with chemical analysis substantiated the inverse relationship between resistivity and sodium oxide content of the fly ash. (Author abstract modified)

54859 **APTIC NO. 77073**

Semrau, Konrad T. and Clyde L. Witham

CONDENSATION AND EVAPORATION EFFECTS IN PARTICULATE SCRUBBING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 12 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-30.1.)*

Experiments to determine the effects of condensation and evaporation on the collection efficiency of a conventional cocurrent-contact particulate scrubber of the orifice type were performed. The effect, if any, of the liquid-to-gas ratio on the collection efficiency was also investigated. A synthetic submicron aerosol was used in the experiments. In the absence of condensation or vaporization effects, the scrubber efficiency was dependent only on the effective friction loss. No independent influences of gas velocity, liquid-to-gas ratio, or contactor orifice size were observed except possibly in the range of very low gas velocities, liquid-to-gas ratios, and gas pressure drops. However, at a given effective gas friction loss across the scrubber, condensation of a substantial amount of water vapor increased the collection efficiency, whereas vaporization exerted the opposite effect. Condensation reduced the effective friction loss required to attain chosen levels of scrubber collection efficiency by as much as 20-50%. (Author abstract modified)

54860 **APTIC NO. 79498**

Shah, Y. T. and J. A. Paraskos

INTRAPARTICLE DIFFUSION EFFECTS IN RESIDUE HYDRODESULFURIZATION. *Ind. Eng. Chem., 14(4):368-372, Oct. 1975. 6 refs.*

Effectiveness factors for sulfur and metals removals from a 50% reduced Kuwait crude are evaluated. Experimental data were obtained from a bench scale catalytic hydroprocessing unit at 760 F and 2000 psia. Typical time dependence of the catalyst activity in the pilot scale reactor is illustrated. Approximate analytical solutions, useful over the entire range of Thiele modulus, for the effectiveness factors for power law type kinetics involving two reactive species are briefly outlined. (Author abstract modified)

54861 **APTIC NO. 77056**

Shirotsuka, Tadashi, Kiyotaka Sakai, Akira Tanaka, and Hitoshi Ozawa

THE SUPPRESSION OF NOX GENERATION BY THE WATER-JETTING METHOD. *(Mizu fushaho ni yoru NOx seisei seigyo). Text in Japanese. Preprint, The Society of Chemical Engineers, Japan, Tokyo, p. 66-67, 1975. 1 ref. (Presented at the Society of Chemical Engineers Japan, Lecture Meeting, 40th, Nagoya, Japan, April 2-4, 1975.)*

Of the parameters in the generation of nitrogen oxides, such as temperature, oxygen concentration, and stability at high temperatures, temperature was most important. Without changing the oxygen concentration and stability at high temperatures, the water-jetting method, was used to lower temperature so that the Nox distribution, combustion temperature, and generation mechanism within combustion chamber could be observed. The combustion chamber, a cylinder 54 mm in inner diameter, 480 mm in length, was cooled by a two-layer tube. A mixture of propane and air was introduced into the combustion chamber. Water-jetting, pressurized by nitrogen gas and a 60 deg jetting angle, was jetted from the upper nozzle. There are 11 side pipes to measure temperature and remove NOx at 40 mm intervals. Both the NOx and temperature distributions showed a strong dependency on temperature. In this experiment, NOx reached a maximum at phi equals 0.9, although it is usually reached at 1.0. Despite water-jetting, the NOx volume still depended on temperature, indicating that water-jetting does not affect the NOx reaction, but merely lowers the temperature. The relationship between heat loss against phi and the ratio of decrease of NOx showed that the NOx loss was large at phi less than 1, but was still large when at phi greater than 1.

54862 **APTIC NO. 79560**

Stenhouse, J. I. T.

FILTRATION OF AIR BY FIBROUS FILTERS. *Filtration Separation (Purley), 12(3):268, 270-271, 273-274, May/June 1975. 15 refs. (Presented at the Filtration Society, Manchester, England, Dec. 12, 1974.)*

The fundamental mechanisms of filtration of air by fibrous filters are discussed. Fibrous filters are widely used for removing particles from air streams and consist essentially of mats through which air is passed. Particles migrate by a number of mechanisms to the surface of the fibers which they are restrained by adhsion forces. The most important particle fiber collision mechanisms are electrostatic, Brownian diffusion, and inertial interception. Both theoretical and high speed photographic evidence show that at its onset the mechanism of particle removal from fibers is simply bounce. In normal systems the mechanism of adhesion is Van der Waal attraction. Attempts to determine theoretically the limited size of particles which will adhere to fibers by equating the bounce and Van der Waal energies are described.

54863 **APTIC NO. 77280**

Stone, Richard C., Roger C. Trueblood, and David G. Young

A PILOT PLANT APPROACH TO SPECIFYING ELECTROSTATIC PRECIPITATORS ON LOW SULFUR WESTERN COAL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. (Presented at the Air Pollution Control Association Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-02.6.)*

Results from over 100 pilot plant tests to determine specifications for electrostatic precipitators serving thermal power plants burning low-sulfur western coal are presented. Tests with a three-stage electrostatic precipitator over a temperature range of 250-600 F indicate that fly ash exhibits a moderately high resistivity at conventional temperatures (300 F); it can, however, be collected in a reasonably sized low-temperature precipitator. Outlet grain loading varies inversely with the specific collecting area, being lower for higher collecting areas. (Author abstract modified)

54864 **APTIC NO. 77209**

Stukel, J. J. and H. G. Rigo

ENERGY EFFICIENCIES OF AIR POLLUTION CONTROL DEVICES. *Atmos. Environ., 9(5):529-535, May 1975. 11 refs.*

A thermodynamic analysis of the minimum energy requirements of various control devices used for removing gaseous and particulate pollutants from gas streams at various levels of collection efficiency is presented. Equations for calculating the energy efficiency (effectiveness) of various control devices are given as a function of both system energy losses and operating and maintenance costs. A plot of the energy efficiency associated with a single cyclone, an electrostatic precipitator, a fabric filter, and a venturi scrubber obtained by ratioing the actual energy required and the theoretical energy calculated for each device reveals extremely low energy efficiencies associated with all of the devices. The most efficient device, the electrostatic precipitator, possesses an efficiency of 0.1%; while the venturi scrubber which is the most energy intensive abatement device of the four possesses an efficiency of 0.008%. The effectiveness of both in terms of power consumption and cost is tabulated for sulfur dioxide control devices utilizing throw-away and regenerable scrubbing processes and dry processes of the catalytic oxidation and copper adsorption type.

54865 **APTIC NO. 77198**

Sugioka, Masatoshi, Takayoshi Kamanaka, and Kazuo Aomura

CONTACT DESULFURIZATION REACTION (24TH REPORT). THE IR SPECTRUM OF ETHYLMERCAPTAN ADSORBED BY ZEOLITE. *(Sesshoku datsuryu hanno--zeoraito ni kyuchaku shita echirukaputan no IR supekutoru). Text in Japanese. Preprint, Chemical Society of Japan, Hokkaido Branch, Hokkaido (Japan), p. 10, 1975. 1 ref. (Presented at the Chemical Society of Japan Hokkaido Branch, Summer Lecture Meeting Hokkaido, Japan, July 26, 1975.)*

The adsorption capacity and adsorption conditions of zeolite were studied by letting Y type zeolite (sodium hydrogen zinc) adsorb ethyl mercaptan and examining their IR spectra using an in situ cell attached to an ordinary vacuum apparatus. Zeolite is heated at 500 C for 4 hr in air, and its disc (20- 30 mg) adsorbs EM 20 cm Hg in the cell at 350 C 10 to the minus four power torr for 3 hr at room temperature. For 30 minutes at room temperature, the gas is let out and its IR spectrum is observed. Adsorption common to all the zeolites used is that based on fluctuation of anhydroxy group around 3500 cm, 165 cm of an alkyl/group around 2960 cm, 1460 cm, and 1380 cm, and adsorption based on a sulfhydryl group near 2550 cm. However, there was a large amount of adsorption based upon S-CH2 around 1260 cm using NaY, a little with ZnY, but none with HY. Adsorption of OH was observed, which is seen as a co-ordinated complex with a metal cation in zeolite, in the case of NaY and ZnY. However, when ZnY is made to adsorb EM, adsorption at 1590 cm shifted to 1650 cm, and the strength of adsorption at 1370 cm decreased. Broad adsorption based upon a hydrogen bond around 3400 cm was very large in case of HY, but not so great in case of NaY, and non-existant in case of ZnY. Adsorption around 1650 cm, after adsorption of EM took place, was greatest in case of ZnY, followed by NaY and HY. Adsorption of EM by zeolite varied, depending upon the type of zeolite used, and adsorption was due mainly to a metal cation in the case of NaY and ZnY. In the case of HY, it was attributable mainly to the OH group.

54866 **APTIC NO. 79408**

Tadokoro, Tomoo

FORCED AIR-COOLED TYPE EXHAUST GAS RECOMBUSTION EQUIPMENT. *(Kyosei kureishiki no haikigasu sai nensho sochi). Text in Japanese. (Toyo Kogyo Co., Ltd. (Japan)) Japan. Model Util. Sho 50-20189. 3p., June 19, 1975. 1 ref. (Appl. July 31, 1970, 1 claim).*

A recombustion device for the treatment of the unburned substances in internal combustion engine is described. Exhaust gas from the engine was first led through a gas pipe to the recombustion chamber in the core of a reactor. Secondary air was supplied to the recombustion chamber and the resulting gas from the recombustion was released from the first exhaust pipe leading from the chamber. Cooled air was introduced through a second gas pipe to the air chamber of the reactor and heat exchange was allowed to occur on the surrounding core of the chamber. More heat exchange occurred between the outgoing combustion gas and the cooling air on the surface of the first exhaust pipe, which was surrounded by the second exhaust pipe from which the cooling air was released.

54867 **APTIC NO. 77196**

Takiguchi, Yoshimi, Kenji Sato, Nobuyuki Iwamura, Tomitsugu Mizuse, Atsushi Morii, and Kiyotaka Sakai

ABSORPTION AND REMOVAL OF NOX BY A POROUS SHELF TOWER. *(Takoita moretana to ni yoru NOx kyushu jokyo). Text in Japanese. Preprint, The Society of Chemical Engineers Japan, tokyo (Japan), p. 64-65, 1975. 1 ref. (Presented at the Society of Chemical Engineers, Japan Lecture Meeting, 40th, Nagoya, Japan, April 2-4, 1975.)*

Using nitric oxide, which is less reactive than nitrogen dioxide and potassium permanganate, as an oxidation absorbent liquid, and an aqueous sodium hydroxide solution as an alkaline absorbent, denitrification studies on stack gases were conducted by the batch system. The concentration of KMnO4 was 0.5% and of NaOH, 1.0%. The tower, having several porous shelves, was selected since it is economical is easily handled, requires small quantities of solution for absorption, does not clog, loses very little pressure and requires very little power. Both flow and absorption experiments were conducted. Pure nitric oxide was diluted to around 200 ppm with air. Typical flow pattern was as follows: liquid collected on the shelves, bubbles forming continually; a bubble layer was formed, and vibration and spray occurred; with an increase in Ug the bubble layer became higher, and both vibration and spraying became active. Even though Ug was increased, there was very little increase in pressure loss. Absorption tests showed that at d equals 3 mm, compared with d equals 5 mm, the flow was unstable and pressure loss was great. At d equals 5 mm, no change in the rate of absorption due to flow volume was observed.

54868 **APTIC NO. 77252**

Tamura, S.

ELECTROSTATIC PRECIPITATOR UTILIZING CORROSION PROOF FRP. *(Taishokusei FRP riyo no denki shujin sochi). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(8):723-732, Aug. 1975. 4 refs.*

Electrostatic precipitators utilizing fiber reinforced plastics (FRP) as materials were developed. Sekisui Cottrells used Leben-1100 FRP as the dust collecting electrode. The Leven-1100 showed high mechanical strength and high resistances to acids and bases. A rectangular electrode chamber was used to minimize the deformation of the FRP caused by the variation of temperature. The rectangular electrode chamber has the advantages of more dense corona discharge and little local sparkover. The capacities of the Sekisui Cottrells ranged from 100 cu/min to 1000 cu m/min. The electrostatic precipitators are applicable in chemical, paper, and steel industries for removing mist, dust, and fumes. The electrostatic precipitator was used for the recovery of sulfuric acid mist in flue gas from a H2SO4 plant. Results showed that 99% recovery was achieved. The apparatus was also effective in preventing white smoke.

54869 **APTIC NO. 77001**

Tawa, N.

DEODORIZING EQUIPMENT WITH HONEYCOMB CATALYZERS. *(Honeycomb shokubai dasshu sochi). Text in Japanese. Kako Gijutsu (Process Tech.), 10(4):244-250, April 1975.*

A catalyst for deodorizing waste gases is described. The catalyst is prepared by placing platinum on cordulite. The catalyst is active when the content of Pt exceeds 0.1%. Various organic solvents are made to burn in the presence of the catalyst at a very low temperature. For example, acetone is made to burn at 130-135 C, and ethyl acetate ignites at 195-205 C. The resistance of this catalyst against the passage of gases is about 1/5-1/10 times that of conventional pellet catalysts with a diameter of 3-6 mm. The gases to be treated pass through the catalyst without bending of the path. Dusts easily pass through without clogging the inside of the catalyzer. The equipment consists of a filter, blower, heat exchanger, preheater, and the catalyst layer. The deodorization is done at a rate of 10-2000 normal cu m/min. This deodorizer has been successful in treating discharged gases from fish oil treatment, rubber working, chemical, and various painting facilities.

54870 **APTIC NO. 77086**

Tennyson, Richard P.

THE CENTRIPETAL VORTEX CONTACTOR FOR SO2 ABSORPTION AND FINE PARTICULATE REMOVAL. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa.,* *12p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-30.5.)*

A centripetal vortex scrubber for sulfur dioxide absorption and fine particulate removal from stack gases is described. The equilibrium droplet diameter created in the centripetal vortex field is substantially smaller than that developed by a conventional kinetic orifice spray contactor at the same energy level, resulting in superior mass transfer and particulate removal. Gas enters the contactor section tangentially, establishing a vortex pattern around a circular arrangement of vanes. Stationary vanes in the contactor element direct and distribute the gas to establish the vortex. Scrubbing liquid is introduced without sprays or restrictive orifices either by an external skirt feed, a central feed pipe, or by establishing a liquid level in the inlet or contactor section. Scrubbed gas exits through the vortex eye and travels vertically to an entrainment separator which is close-coupled to the contactor section. Pilot and field tests indicate that the centripetal vortex scrubber consistently requires 1/3 to 1/2 less pressure drop than conventional venturi scrubbers for the same outlet grain loading.

54871 **APTIC NO. 79083**

Theodore, Louis and Anthony J. Buonicore

VAPOR CONTROL BY CONDENSATION: PERFORMANCE EQUATIONS AND DESIGN PROCEDURES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-23.2.)*

A general method for predicting the collection efficiency and determining the design parameters of surface condensers used for controlling the discharge of condensable vapor pollutants to the atmosphere is presented. The only information required is the phase equilibrium constant (or vapor pressure) and enthalpy data for the system components. Illustrative examples concerning performance prediction and the solution of a typical design problem are included. The method appears to be a valuable aid in surface condenser design for condensable vapor-noncondensable gas mixtures. (Author abstract modified)

54872 **APTIC NO. 79085**

Trieff, Norman M. and V. M. Sadagopa Ramanujam

OXIDATION OF AROMATIC AMINE AIR POLLUTANTS USING CHLORAMINE-T AND HYPOCHLOROUS ACID. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1975. 30 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-23.5.)*

Experiments investigating the potential applicability of chloramine-T as a scrubbing liquid for the oxidation of aromatic amines in stack gases were performed, and the results were compared with limited studies using hypochlorous acid as a scrubbing agent. Aromatic amines studied included: aniline and its derivatives, para-chloroaniline, para-bromoaniline, para-iodoaniline, para-nitroaniline, and para-toluidine. The initial products in each case were the corresponding N-chloroamine and para-toluene sulfonamide. The kinetics in each case showed a first order dependence on CAT and fractional order dependence on the amine. The latter observation indicated that the reaction proceeds via the formation of a complex in a fast equilibrium step followed by a slow decomposition of the complex to give the products. Odor studies demonstrated a marked reduction in odor intensity as a result of the oxidation. Chloramine-T is preferable as a scrubbing liquid to HOCl in view of its greater stability even though the rate of reaction with the corresponding amine is somewhat slower for CAT than for HOCl. (Author abstract modified)

54873 **APTIC NO. 77182**

Trifiro, Ferruccio, Pier Luigi Villa, Italo Pasquon, Antonio Iannibello, and Vittorio Berti

RESIDUAL OIL HYDRODESULPHURIZATION ON FOUR COMPONENT CATALYSTS. *Chim. Ind. (Milan), 57(3):173-175, March 1975. 15 refs.*

Residual oil hydrodesulfurization on four component catalysts using oxides supported on gamma-alumina and cations of iron, zinc, or calcium in addition to molybdenum and cobalt was studied to investigate the possibility of preparing catalysts less rich in Co than commercial catalysts. Calcium showed an inhibiting effect, while iron and zinc ions substituted to a certain extent for Co ion in the catalysts. Catalysts containing iron or zinc contained a quantity of coke greater than that found in industrial catalysts. The catalysts tested showed a rapid increase in activity during the first 40-50 hr which resulted from coke deposits. The four component catalysts showed an inferior selectivity to that of three component catalysts containing cobalt oxide, molybdenum oxide, and gamma alumina.

54874 **APTIC NO. 77291**

Tschanz, John F., Richard R. Cirillo, Donald M. Rote, and Joseph E. Camaioni

AIRCRAFT CONTROL MEASURES FOR EMISSION REDUCTION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1975. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-03.5.)*

A model of the dispersion of pollutants from aircraft activity at the Hartsfield Atlanta International Airport is used to evaluate the effectiveness of several operational strategies for controlling aircraft emissions. Normal operations at the airport produce approximately 4% of the total regional pollutant emissions. Aircraft emissions of carbon monoxide and hydrocarbons are reduced by more than 30% by the use of towing, fleet mix control, and engine emissions strategies. Only the last strategy is effective in reducing nitrogen oxide emissions. The effectiveness in reducing pollutant concentrations at several receptor sites around the airport follows the same pattern as emission reductions. The towing strategy is most effective for reducing CO and hydrocarbon levels, but engine emission standards provide more consistently large reductions of the three pollutants. Emissions from the airport appear to endanger the ambient air quality standard for hydrocarbons downwind of the airport, and no single strategy is sufficient alone to assure attainment of the standard. (Author abstract modified)

54875 **APTIC NO. 79569**

Tsuboi, Nobutoshi and Takao Nonoyama

FOUR M-U ENGINE FOR TOYOTA CROWN. *(50 nengata kuraun tosai 4M-U gata enjin). Text in Japanese. Toyota Gijutsu (Toyota Eng.), 24(4):541-553, July 1975.*

In order to comply with the 1975 automobile emission standard, the new 4M-U engine was developed by modifying the 4M engine and adding an exhaust gas cleansing system. The deterioration in engine performance due to the use of emission control devices was compensated for by major modification of engine structure, and the reliability was greatly improved. As emission control devices, a secondary air injection system, throttle positioner, exhaust gas recirculation system, ignition timing control device, and catalytic converter were installed. These systems are operated by mechanical control systems actuated by the negative pressure of the intake manifold and carburetor or delivery pressure of the air pump. Descriptions of modifications made on engine structure and emission control devices added are given with design objectives, specifications, and characteristics.

54876 ***APTIC NO. 77253***

Tsuji, Y.

ON THE DUST-COLLECTING IN THE COPPER ORE DISSOLUTION REVERBERATORY FURNACE. (Doko yokai hansharo ni okeru shujin ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(8):714-722, Aug. 1975.

A reverberatory furnace (Cottrell) was installed at the Onahama Seiren Co. in 1965. The Cottrell was a 2 series-4 chamber type having a capacity of 1720 N cu m/min. The flue gas for treatment contained 2.8% sulfur dioxide and 10 g/n cu m dust. The Cottrell gave a collection efficiency as high as 98% at a gas flow rate of 0.90 m/s. Problems such as clogging of the rectifying plate, overload, and inadequate voltage adjustment were encountered fairly frequently and the collection efficiency occasionally dropped to as low as 50%. An improved Cottrell was installed in 1969 and another in 1972 for better operation. The final Cottrell was a 2 series 3-chamber type having a capacity of 1450 N cu m/min. The distance between the dust-collecting electrodes was widened and larger discharging wires were used. The gas flow rate was reduced from 0.9 m/sec to 0.7 m/sec. The problems were solved and the collection efficiency was maintained at 98%.

54877 **APTIC NO. 76956**

Tsunemi, M.

PURIFICATION OF AUTO EXHAUST GAS BY CATALYST. *(Shokubai ni yoru jidosha haikigasu no jyoka). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 11(7):635-643, July 1975. 12 refs.*

A general discussion is given on catalytic removal of nitrogen oxides in automotive exhaust gas. The goal for NOx emission standards in 1978 has been set at 0.25 g/km compared to 1.2 g/km in 1975. The catalysts for the reduction of NOx require high reactivity at a wide range of temperature, high selectivity, and long endurance with strong resistance to sulfur poisoning. Metal catalysts for NOx reduction show reactivity in the decreasing order of platinum, rhenium, palladium, nickel, cobalt, and iron. High reactivity generally gives low selectivity so that further reduction of the resulting nitrogen to ammonia is a predominant side reaction. Formation of NH3 can be effectively reduced by controlling the carbon monoxide to oxygen ratio in the exhaust gas before catalytic reduction. Hydrogen in the exhaust gas is formed by the reaction of CO and water at high temperature and control of CO can reduce the H2 and subsequently the NH2 in the exhaust gas. Good results are obtained at a CO/O2 ratio between 4 and 10. A two-stage catalyst bed type with ruthenium as reducing agent for the first stage and Pt as oxidizing agent for the second stage was tested for NOx reduction for a V-8, 350 cu in. engine. The NOx emission was as low as 0.19-0.28 g/mile.

54878 **APTIC NO. 75892**

Walker, D. C., H. W. Husa, and I. Ginsburgh

DEMONSTRATION OF REDUCED HYDROCARBON EMISSIONS FROM GASOLINE LOADING TERMINALS (FINAL REPORT). *Amoco Oil Co., Naperville, Ill., Environmental Protection Agency Contract 68-02-1314, Program Element 1AB015, ROAP 21AFD-021, Rept. EPA-650/2-75-042, 54p., June 1975.*

NTIS: PB 243363/AS

An oxidizer system for controlling hydrocarbon emissions from gasoline loading terminals was tested at a gasoline truck loading terminal that pumps about 2 million barrels of gasoline per year. Tests run during each of the four seasons demonstrated that the oxidizer safely and efficiently disposed of 99+% of the vapor it received, even in extremely cold weather, when the air- gasoline vapor mixture was in the flammable range. A large portion of the vapor from trucks initially did not reach the oxidizer because of blockage caused by liquid carryover to the vapor collection system. After this was corrected, collection and disposal of the vapor exceeded 90%. The efficiency and low flame temperature of the oxidizer limit the generation of emissions from it. (Author abstract modified)

54879 **APTIC NO. 79509**

Wasag, Tadeusz, Jadwiga Galka, and Marek Franczak

THE EFFECT OF ORGANIC ACIDS ON SO2 ABSORPTION KINETICS. *(Wplyw Kwasow organicznych na kinetyke absorpcji SO2). Text in Polish. Ochrona Powietrza (Warsaw), no. 3:72-76, 1975. 9 refs.*

A study of ways to remove sulfur dioxide more rapidly by absorption from the waste gases emitted by the smokestacks of an electrical power plant is discussed. To achieve this effect, an aqueous suspension of calcium carbonate (CaCO3) was used. Sulfur dioxide absorption can be increased up to 90% by adding some organic acids to the suspension, an effect probably attributable to a higher concentration of Ca(++) ions in the solution, achieved by initially dissolving CaCO3 in organic acids. The factors affecting the exchange of the mass K(subscript SO2) in the SO2 absorption process of the CaCO3 suspension plus organic acid were about 50% more effective than those acting in a pure chalk suspension. Among 8 acids studied, citric acid showed the greatest influence on the process under discussion. It improved the solubility of CaCO3 and thus increased SO2 absorption. It was confirmed that citric acid inhibited the oxidation of calcium sulfite (CaSO3) to sulfate. The absorption resistance in the CaCO3 suspension with citric acid was only found during the gaseous phase of the process. It is economically important that the CaCO3 suspension with citric acid can be reused five times. The absorptivity of the suspension was maintained.

54880 **APTIC NO. 77188**

Watanabe, T. and M. Nishigami

LOW-NOX PERFORMANCE AND NOISE REDUCTION OF SELAS BURNER. *(Siirasu bana no tei NOx seino to soon taisaku). Text in Japanese. Kemikaru Enjiniyaringu (Chem. Eng.), 20(1):45-52, Jan. 1975. 3 refs.*

The Selas burner, which is the only type of burner used in the selas reaction furnace, was tested for its ability to control nitrogen oxides emissions. A silencer was developed for the prevention of noise. At present, all types of selas burners are ready for use of heavy oil fuels. All selas furnaces have cupblock type burners. The fuel is mixed with air in a cupblock in which flame is formed along the inner surface. The inner surface becomes a powerful heat generator and source of radiant heat. The noise generated by jets of fuel gas and air friction suction is significant and may be reduced about 15 horn by the silencer.

54881 **APTIC NO. 77274**

Watanabe, Tamotsu

PURIFICATION APPARATUS FOR POLLUTED GASES. *(Osen kitai no seijo sochi). Text in Japanese. (Nippon Kogei Kogyo Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-11626. 6p., May 2, 1975. 1 ref. (Appl. Nov. 12, 1970, 1 claim).*

A purification installation is described for collection by electrical means of dust particles contained in gases, in enclosed areas such as tunnels and within factories. Ceilings and walls, kept at ground potential (positive), in contact with one terminal of a high-voltage generator, are used as dust collection electrodes. The other terminal of the high-voltage generator is in contact with the pointed negative electrode (in mesh form, flat or bowl-shaped). Attached to this pointed negative electrode, but insulated from it, on the side away from the wall or ceiling, is a pointed acceleration discharge electrode (positive), which can be of flat or bowl-shaped mesh form, with needle-like projections pointing toward the pointed negative electrode. The order of arrangement is: collection electrode (positive, ground potential), pointed electrode (negative, where high voltage is applied), and pointed acceleration discharge electrode (positive, desirably at ground potential). Distances between the electrodes are determined by voltage applied to the electrodes. When a high potential difference is applied, discharge occurs in the electric field between the negative pointed electrode and the positive needle-type, discharge electrode. Gases ionized thereby are accelerated between the two electrodes and form a convection current passing through the mesh structure of the negative pointed electrode. The ionized dust particles settle on the collection electrodes (ceiling, walls, and mesh structure suspended from the ceiling).

54882 **APTIC NO. 78999**

Weisenberg, Irwin J. and Phillip Wondra

RETROFIT SO2 CONTROL TECHNIQUES FOR EXISTING EQUIPMENT AT ARIZONA SMELTERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1975. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-23.1.)*

Currently available and potentially available sulfur dioxide control techniques applicable to primary copper smelters are discussed. Although currently available technology for the collection of strong streams (10-11% SO2) is being used by nearly all copper smelters, weak stream reverberatory furnace gases (0.4-1.5% SO2) are not being collected. In addition to stack gas desulfurization systems and sulfuric acid plants on the strong streams, concentration systems can be used to collect the weak streams and produce a strong enough stream to feed a sulfuric acid plant. Various absorptive scrubbing and regenerating systems for obtaining 80-100% SO2 that can be liquefied or mixed with other gases to adjust concentration for acid plant use are reviewed. Techniques to extend the useful capture range include: the addition of increased preheater capacity to provide for operation below autothermal SO2 concentrations, the use of refrigeration to reduce the water content of gases for the production of concentrated acid, and the provision of an additional SO2 source such as liquid SO2 or an auxiliary sulfur burner. Oxygen enrichment of the air used in the reverberatory furnace to increase the SO2 content as well as the production rate also appears attractive. (Author abstract modified)

54883 **APTIC NO. 77030**

Yabe, Toru

ON THE COLLECTION OF SOOT AND DUST PARTICLES IN A NON-FERROUS METAL REFINERY. *(Hitetsu kinzoku seirenjo ni okeru baijin oyobi funjin hoshu ni tsuite). Text in Japanese. Nenryo Oyobi Nensho (Fuel and Combustion), 42(8):673-683, Aug. 1975.*

The background and present status of collection and treatment processes and operational examples in copper and lead refining processes are described for the Saganoseki Refinery of Nippon Mining Co., Ltd., Japan. In 1 mo, the refinery has the production capacity for 20,000 tons of crude copper, 3000 tons of lead, 65,000 tons of sulfuric acid, and 1500 tons of ferronickel (as pure nickel). In the copper refining process, the following dusts and soot collection procedures are utilized. Ore is stored in an enclosed area, and transported by an enclosed belt conveyer to the dryer. Hoods suck up fumes for treatment by Cottrell precipitators. Fumes which escape during the pouring process are collected by other hoods for use by the sulfuric acid factory. Dust arising during the processes is handled in enclosed systems, collected, and sent to the appropriate furnaces for further treatment. Nine Cottrell precipitators are installed in the copper refinery to handle up to 5000 N cu m/min of wet gas, at temperatures up to 450 C, with a collection rate of 70-99%. Six bag filters, with filtration areas ranging from 30-340 sq m, are in use. Dusts from lead refining processes are contained in enclosed systems, wherever possible, or collected with bag filters. Ten bags, made of synthetic fibers, with filtration areas ranging from 400-2700 sq m, are used. The total filtration area of these bags is 7945 sq m. Dust of high moisture content is collected by an air tumbler. Zinc is recovered from part of the collected dust; other portions of collected dust are recycled into the refining process. Water used in the factory is collected and recycled for further use.

54884 **APTIC NO. 77267**

Yagi, Shizuo, Isamu Minowa, and Toru Hatanaka

COMBUSTION CHAMBER EQUIPMENT FOR INTERNAL COMBUSTION ENGINE. *(Nainen kikan no nenshoshitsu sochi). Text in Japanese. (Honda Motor Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-12529. 4p., May 13, 1975. (Appl. Feb. 26, 1971, 2 claims).*

A device is described for an internal combustion engine comprised of primary and secondary combustion chambers, whereby the volume of the secondary combustion chamber is reduced at times when engine is idling, or in a low-load stage. The combustion volume regulator is attached to the secondary combustion chamber. The size of the opening connecting the primary and secondary combustion chambers is also regulated at the same time, so that at times of low load, the size of the opening is increased. The regulatory device is activated by the negative pressure of air intake. As air intake decreases (low-load conditions), this situation is communicated to the secondary combustion chamber through a system of a diaphragm, spring, and hydraulic piston arrangement, using oil as the pressure-transmitting medium. At times of low load, when the opening between the primary and secondary chambers is enlarged, the secondary combustion chamber, where ignition occurs, is more easily swept clean of combustion residue, so that subsequent ignitions occur readily. At times of high load, when the opening is reduced, air-fuel mixture from the primary combustion chamber is prevented from flowing into the secondary chamber, causing excess turbulence and dilution of the proper air-fuel ratio. Desirable combustion volumes in the secondary combustion chamber should be from 6-12% of the clearance volume of the primary combustion chamber.

54885 **APTIC NO. 77268**

Yagi, Shizuo and Minoru Atsumi

A RUN-ON PREVENTION DEVICE FOR ENGINES. *(Enjin yo ran-on boshi sochi). Text in Japanese. (Honda Motor Co., Ltd., Tokyo (Japan)) Japan. Pat. Sho 50-12542. 5p., May 13, 1975. (Appl. Dec. 11, 1972, 7 claims).*

A device to eliminate run-on and continuing action in spark ignition engines when the ignition switch is turned off is described. This device includes a way in which late closing of one or more throttle valves is prevented. The anti-run-on device makes use of a solenoid control valve, operating in conjunction with a dash-pot setup, which ensures instantaneous closing of the throttle valve when the ignition circuit is opened. This control device can be used in engines having more than one source of fuel supply, and is independent of equipment used to control engine action to minimize undesirable emissions.

54886 **APTIC NO. 76968**

Yamamura, Michio

SIMPLE DUST COLLECTOR. *(Kani shujin sochi). Text in Japanese. (Assignee not given.) Japan. Model Util. Sho 50-15661. 2p., May 15, 1975. (Appl. April 17, 1971, 1 claim).*

At the central top of a conventional cyclone, a cylinder is placed coaxially. An inner tube is installed in this cylinder at a distance from the inside of the cylinder. A suitable number of shielding plates are installed between these inner and external cylinders to make the gas wind spirally as it comes up from the cyclone and escapes out of the cyclone through the space between the two plates described above. A suitable number of openings are present on the external cylinder. With these installations, the gas coming up from the cyclone is rotated as it proceeds upwards through the inner and external cylinders. Then the dust particles, which were too small to be removed from the main body of the cyclone, are ejected out of the openings on the external cylinder and are collected in the main body of the cyclone. Thus the dust particles smaller than 10 micron in diameter are effectively collected because the speed or rotation in the 2 cylinders is much larger than that in the main body of the cyclone.

54887 **APTIC NO. 79376**

Yamanka, T.

UTILIZATION OF CATALYST IN AIR POLLUTION CONTROL. NO. 4. *(Kogai boshi gijutsu ni okeru shokubai no riyo (4)). Text in Japanese. Kagaku Kogyo (Chemical Ind.), 26(10):1036-1040, Oct. 1975.*

The description of a catalytic oxidation deodorization system developed by Nippon Engelhard Co. is given with a flow sheet and some operating data. The system is used in various industries for the treatment of malodor and organic solvents emitted by plastic, printing, painting, chemical, organic fertilizer and sewage treatment plants. Characteristics of the catalytic oxidation method are low fuel cost due to low reaction temperature, low production rate of nitrogen oxides, a high safety factor, complete oxidation at low oxygen concentrations, use of stainless steel for equipment and independence from the effects of water vapor. Problems of catalyst poisoning in each field of application are reviewed. The economic aspects of deodorization by catalytic oxidation were evaluated in comparison to the direct combustion method, based on available data, which indicated that the running cost of the catalytic oxidation process is about one-fourth of the cost of the direct combustion method.

54888 **APTIC NO. 77000**

Yamashita, Yoshifumi and Shigeo Sakai

THE CLEANER FOR THE ARC FURNACE FACTORY. *(Aaku ro kojo no shujin sochi). Text in Japanese. (Daido Seiko Co., Ltd., Nagoya (Japan)) Japan. Model Util. Sho 50-11764. 4p., April 12, 1975. 2 refs. (Appl. Dec. 24, 1970, 1 claim).*

This invention is related to an apparatus with which the dust in arc furnaces is effectively removed without interrupting the operation of the furnace. The dust removal is made inside the furnace when the cover of the furnace is closed and is made from the outside when the cover is open. Namely, a duct is connected to a movable duct used for the removal of smoke. To this duct the lower end of an auxiliary duct, which is open to the top of the building, is connected. A suction pipe is connected to desired points on the auxiliary duct. A damper is placed at the point of connection of the suction pipe. A ventilation hole is made at the top of the building. Both the movable duct mentioned above and the duct fixed to it are connected to this ventilation hole when the cover of the furnace is opened. A shutter is installed in such a way that it opens when both the movable duct and the duct fixed to it are open to the ventilation hole and that it closes otherwise. Thus the dust in the building is continuously removed all through the time of the operation of an arc furnace.

54889 **APTIC NO. 77102**

Yerino, Iario V., Thomas C. Ponder, Jr., and Charles Chatlynne

ESTIMATING COSTS OF FLUE GAS DESULFURIZATION SYSTEMS FOR UTILITY BOILERS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-48.2.)*

The costs of limestone and Wellman-Lord flue gas desulfurization systems and factors relating to the variability in costs are discussed. An analysis of 12 model plants is presented to illustrate four varying cost factors: plant size, installation status, desulfurization system type, and degree of sulfur dioxide control required. The capital cost impact of varying SO2 removal requirements is between 15-20% of the total capital cost. Installation status (new versus retrofit) can affect the total capital cost by 10-40%. Particulate control requirements can exert a capital cost impact of between 25-35%. A capital cost impact of between 10-30% is associated with sludge removal requirements. Detailed breakdowns for both the limestone and Wellman-Lord processes are given for boiler capacities of 250, 500, and 1000 MW.

54890 **APTIC NO. 77045**

Yoneda, T.

THE USE OF FABRIC FILTERS FOR DUST AND FUME CONTROL OF SLUDGE INCINERATORS. *(Odei syokyakuro haigasu o shutai to shita rokashiki shujin hoshiki). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 11(7):777-781, July 1975. 2 refs.*

The bag filter method may be used to control the emission of dust and fumes from sludge incinerators. Experiments were conducted with a 250 kg/hr-capacity incinerator, using heavy oil as fuel when necessary, treating 2000/N cu m/hr gas, a 800 C at the outlet of the incinerator. The gas was first cooled in a forced cooling tower from 700 C to about 580 C, then cooled to 250 C. Dust concentration was reduced from 3.7 g/N cu m to 3.8 mg/N cu m. Mechanical shaking was applied. Noise was reduced from 90 decibels to 60 decibels, using muffler and a silencing cabin. The temperature of the incinerator was kept at 800 C to reduce odor. As dust adhered to rotary valve, noise was emitted. In winter, the oil in the sludge became mist and escaped from the bag, adhering to the outer wall of the dust collector. Teflon was excellent as a filtering cloth, but is expensive and not generally used. Therefore, heat-resistant nylon fiber is used, although it is not resistant to acid. At the Shinto Dust Collector Co., adsorbents such as activated charcoal and zeolite are used to eliminate odors. Care is taken not to cause reflying by adding water to the dust which is emitted from the dust collector hopper by rotary valve. The mixed dust contains 20-40% water, and the bulk is reduced to about one fifth.

54891 **APTIC NO. 79406**

Yoshida, T., R. Tazawa, Y. Ueno, and Z. Koshitani

REDUCTION OF NOX BY COKE (I) --- IN WASTE GAS NOT CONTAINING H2O. *(Kokusu ni yoru NOx no seshoku kangen --- kikusu ni yoru mizuke hi inyu haigasu (1)). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan) (Tokyo), 54(581):766-773, Sept. 1975. 13 refs.*

Model boiler waste gas containing 200 ppm to 2000 ppm nitric oxide was passed through a coke bed heated at 800-950 C at space velocity of 400/hr to 4600/hr. Nitric oxide was analyzed by phenoldisulfonic acid method, and nitrogen, oxygen, hydrogen, carbon monoxide and carbon dioxide were analyzed by gas chromatography. At 1300 ppm and 2000 ppm NO concentrations and 400/hr and 800/hr space velocity, more than 98% of the NO was removed at 800-850 C. At 1457 ppm NO concentration and 800 C, the rate of NO removal decreased from 97% at 800/hr space velocity to 67.5% at 6400/hr space velocity. Results also showed that the smaller the grain size of the coke was, the higher was the rate of removal. The resistance of 5-10 mesh coke at 6400/hr space velocity and 750-775 C was found to be 0.16-0.18 cm ag.

54892 **APTIC NO. 77199**

Yotsuyanagi, Takao, Hideto Ohno, and Kazuo Aomura

AUTOMATIC SWEETENING IN LIQUID OF MERCAPTAN BY DITHIOLENE COMPLEX. *(Jiochiren sakutai ni yoru merukaputan no ekiso jido sanka). Text in Japanese. Preprint, Chemical Society of Japan, Hokkaido Branch, Hokkaido (Japan), p. 11, 1975. (Presented at the Chemical Society of Japan, Hokkaido Branch, Summer Lecture Meeting, Hokkaido, Japan, July 26, 1975.)*

A sweetening reaction test was conducted in the presence of a non- ligand buffer, using acetonitrile as a solvent under constant oxygen pressure, and measuring the volume of oxygen consumed by the oxidant reaction. The reaction was initiated by pouring mercaptan solution or complex cystal. After a certain time the remaining mercaptan was measured by gas chromatography. Of the metal ions, Fe plus 3 and Co plus 3 mnt complexes were found to be very active, and the order of their activity was in keeping with their redox reactions and the order of E to the one-half power. In the case of Co plus 3, volume ratio of mercaptan and oxygen was 2:1, and in the case of Fe plus 3, it was 3:1. In the case of (Cu(Phen)2)2 complex, the ratio depended on concentration, varying from 2:1 with 10 to the minus 4 power mol/l to 3:1 at 10 to the minus 2 power mol/l, indicating the presence of an intermediate mechanism. In the case of mnt to the minus 2 power complex, it was presumed that Fe plus 3 and Co plus 3 were dimer complexes. In the case of Fe plus 3 the existence of RSH was indispensable for dimerization. It took about 8 min for the oxidation of benzylmercaptan of 2 times 10 to the minus 2 mol/l. Its turnover rate as catalyst was over 80,000 times, proving the excellent catalytic ability of these complexes.

54893 **APTIC NO. 75898**

Wisconsin Electric Power Co., Milwaukee

STONE AND WEBSTER/IONICS SO2 REMOVAL AND RECOVERY PROCESS (PHASE 1, FINAL REPORT). *Environmental Protection Agency Contract 68-02-0297, Program Element 1AB013, ROAP 21ACX-082, Rept. EPA-650/2-75-045, 253p., May 1975. 11 refs.*

NTIS: OB 243720/AS

Phase 1 of a potential three-phase program to evaluate the Stone and Webster/Ionics stack gas sulfur dioxide removal and recovery process at a 1-megawatt pilot plant scale, with the option to scale up and demonstrate process viability at the 75-megawatt prototype level, is described. The flue gas SO2 removal and recovery process employs electrolytic regeneration of the working fluids and considerably reduces solids handling and disposal problems inherent in lime/limestone slurry systems. It also offers operational advantages for utilities over other regenerable systems. The technical feasibility of the process was demonstrated on a 2200 ACFM pilot plant by meeting emissions and operating requirements over a representative range of conditions. The average SO2 removal was 85-95% at exit concentrations of 200-300 ppm SO2. The economics of a 75-megawatt prototype plant do not appear favorable, and there are no current plans to continue into Phase II or Phase III of the program. (Author abstract modified)

54894 **APTIC NO. 75909**

ENVIRONMENTAL PROTECTION. *(Umweltschultz). Technica, 1975: 202-203, March 24, 1975. Translated from German, 5p.*

Control devices currently being used in Europe to reduce waste gas emissions are described. A newly developed gas scrubber capable of gas flows up to 100,000 cu m/hr is being used in conjunction with oxidation by ozone to control odorous emissions from food processing operations and sewage treatment plants. A catalytic afterburner is being used to treat exhausts containing plasticizer vapors and solvents. Energy from the latter process is recovered in the form of hot water with the aid of a heat exchanger.

54895 **APTIC NO. 76950**

Ishikawajima-Harima Heavy Industries Co., Ltd. (Japan), Research Labs.

ON NITROGEN OXIDES CONTROL. *(Chisso sankabutsu taisaku ni tsuite). Text in Japanese. Kanagawaken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), p. 161- 169, Feb. 1975.*

Six burners were developed and tested for their nitrogen oxides prevention effects. A pressure injection flame division burner uses sticks to divide a flame into many small independent flames, and a steam injection flame division burner uses several nozzles to give a group of independent flames. The third burner applies a multi-stage long flame combustion method while the fourth burner employs circulation swirl mixing combustion method. A circle-type flat-flame burner forms thin but wide and flat flames while a fan-type flat-flame burner generates thin and flat flames by using a rectangular air slot. Applications of the burners to a testing furnace consuming 4000 l/hr of C heavy oil revealed that: the flame division burners generally gave low hydrocarbon and NOx concentrations; the multi-stage long flame burner gave low HC concentration, but only slightly improved NOx emission compared to a conventional burner; the circulation swirl mixing flame gave low NOx but high CH concentration; the circle-type flat flame burner gave medium NOx concentrations but low HC concentration; and the fan-type flat flame burner gave low NOx but very high HC concentration.

54896 **APTIC NO. 76953**

Tokyo Gas Co., Ltd. (Japan)

NOX REDUCTION MEASURES OF THE EXISTING COMBUSTION FACILITY. *(Kisetsu nensho shisetsu no NOx teigen taisaku). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), vol. 1975:175-183, Feb. 1975.*

Efforts were made in 1972 to reduce 90% of the total nitrogen oxides emissions from 2 boilers at the Negishi plant of the Tokyo Gas Works. Boiler 1 had a capacity of 19 tons/hr and a maximum load of 615,000 kcal/hr and boiler 2 had a capacity of 38 tons/hr and a maximum load of 900,000 kcal/hr. Conversion of fuel from heavy oil to gas resulted in NOx reduction from 350 ppm to 170 ppm for boiler 1 and to 200 ppm for boiler 2 at 50% air register opening. At 63% load, the NOx concentration was further reduced to 120 ppm for boiler 1 by decreasing the air register opening to 25% m but the NOx concentration increased at low air register opening for boiler 2. Off-stoichiometric combustion by using two burners at different levels reduced the concentration to 50-70 ppm for boiler 1 and to 90 ppm for boiler 2. Other effective measures for NOx reduction included steam injection, water injection, and reduction of the air temperature for combustion.

54897 **APTIC NO. 77006**

Kanagawa Prefectural Environmental Center (Japan)

VARIATION OF TOXIC COMPONENTS IN THE AUTO EXHAUST GAS BY THE IGNITION TIME ADJUSTMENT. *(Tenkajiki choseito ni yoru jidosha haishutsu gasu chu no yugai seibun no henka). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution in Yokohama-Kawasaki Ind. Area), no. 17:158-160, Feb. 1975.*

The efficiency of the vacuum advancing apparatus to control the ignition timing for auto exhaust emission control was studied using three automobiles with and without the installation of the apparatus. The experiments were conducted on a dynamometer at different running speeds (30, 40, 60, and 80 km/hr), and the exhaust gases were collected by the constant volume sampling method, and were then analyzed by nondispersive infrared analyzer for carbon monoxide, flame ionization detector for hydrocarbons, and chemiluminescence for nitrogen oxides. The automobiles tested were one four-cylinder engine, and two two- cylinder engines. Without the use of the vacuum advancing apparatus, the emission levels could be altered by rotating the distributor so that the ignition timing could be changed between 20 to 0 deg before top dead center. With this adjustment, the carbon monoxide, nitrogen oxides, and hydrocarbon emission levels were the lowest at the top dead center for the four cycle engine. When the vacuum advancing apparatus was installed, the CO emission decreased to 1 to 18% of that without the apparatus depending upon the running speeds. The reduction rate was greater at higher running speed than slower speeds. The reduction of NOx emission with the apparatus did not vary very much with the running speed, and it ranged from 15 to 24%. The HC emission reduction achieved by the apparatus was similar to that achieved by the rotation of the distributor.

54898 **APTIC NO. 77034**

PROCEDURES FOR TESTING EFFICIENCY OF AIR CLEANING DEVICES (JACA NO. 10: ENACTED SEPT. 10, 1973; REVISED JUNE 25, 1975). *(Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 13(2): 26-39, June 1975. 20 refs.*

Procedures for testing the efficiency of five types of air cleaning devices are outlined. The devices are: (1) prefilter for collecting airborne dust indoors and outdoors; (2) air purification equipment (automatic roller type or electrostatic air cleaners) for use indoors and outdoors to collect airborne dust as well as control ventilation and condition the air; (3) HEPA filters (high efficiency particulate air filters) for collecting extremely minute particulates in the air; (4) air purification equipment for removing toxic gases indoors and outdoors; and (5) air purification equipment of the internal air blower type for collecting and removing airborne particulates and/or toxic gases. For (1), pressure loss, rate of dust collection, and dust retention volume are measured, using standard dust of various concentrations (30 + or - 10 mg/cu m; 100 + or - 10 mg/cu m). For (2), pressure loss, rate of dust collection, dust retention volume, and concentration of emitted ozone (in terms of 0.01 ppm) are measured. For (3), pressure loss, rate of dust collection (using dioctyl phthalate particles, 0.3 micron), leakage, and pressure resistance, are measured. For (4), pressure loss, rate, and volume of gas removal (dry) are measured. For (5), amount of wind (cu m/min), noise, consumption of electricity, rate of dust collection, dust retention volume, and rate and volume of gas removal are measured. Toxic gases tested in (4) and (5) and sulfur dioxide, carbon monoxide, ozone, carbon tetrachloride, acetone, ammonia, and hydrogen sulfide.

54899 **APTIC NO. 77232**

Kanagawa Prefectural Government (Japan)

PRESENT SITUATION OF NOX EMISSION FROM INDUSTRIAL BOILER AND ITS CONTROL MEASURE. *(Sangyo-yo boira ni okeru NOx haishutsu no genjo to yokusei taisaku). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Hokoku Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 17:191-201, Feb. 1975.*

Numerous factors affecting emission concentration of nitrogen oxides from industrial boilers can be reduced to the percentage of excess air, combustion air temperature, and calorific capacity of combustion chamber for a given type of boiler by a given type of combustion method. Data on the relationship between NOx emission concentration and calorific capacity of combustion chamber, NOx emission concentration and coefficient of excess air, and effect of air temperature on NOx emission concentration in the case of a water boiler using an NFK-COEN burner are compiled and analyzed. The formation rate of NOx by combustion reaction is lower at lower oxygen concentration and lower flame temperature. The NOx control measures by means of reducing O_2 concentration include multi-stage combustion, non-equilibrium combustion, and combustion with low percentage of excess air, while the low flame temperature combustion includes direct spraying of water or water vapor and the exhaust gas recirculation method. Data on the effect of water vapor spraying, exhaust gas recirculation method using NFK-COEN DAZ, low percentage of excess air and multi-stage combustion on the reduction of NOx concentration are also compiled and analyzed. The description of the NFK-TRW and NOx burner is given with characteristics and combustion test results.

54900 **APTIC NO. 77250**

Yokohama National Univ. (Japan) Faculty of Engineering

FUNDAMENTAL STUDIES ON THE HYDROGEN CHLORIDE OCCURRENCE PREVENTION IN THE INCINERATION OF REFUSE CONTAINING POLYVINYL CHLORIDE. *(Pori enka biniru o fukumu gomi shokyaki ni okeru enka suiso hassei boshi ni kansuru kisoteki kenkyu). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 17:136-144, Feb. 1975. 10 refs.*

Combustions of commercial polyvinyl chloride (white powder, 80-120 mesh) and waste PVC sheets (with 0.0015% Cd and 0.014% Pb as stabilizers) were carried out by using a vertical type and a horizontal type electric furnace. Air was passed during the combustion, and hydrogen chloride gas in the combustion gas was absorbed in three absorbing bottles filled with H_2O. The HCl was analyzed by the rhodan-mercury method. At heating temperatures of 200 to 500 C for 60 to 120 min, 0.58 g (100%) of HCl was generated and collected by the three absorbing bottles from 1 g of the PVC powder. Only 0.28 g of HCl was generated by 1 g of waste PVC sheet. When 1 g of calcium hydroxide was used to cover 1 g of PVC powder before combustion, only 0.07 g of HCl was collected. Addition of 2 g of $Ca(OH)_2$ to 5 g of the waste PVC resulted in 89% HCl removal. Addition of lime stone ($CaSO_4$) resulted in 20% HCl removal. The highest efficiency of HCl removal was found at 400 C to 500 C.

54901 **APTIC NO. 79358**

Special Commission on Air Pollution Control (Japan)

PRESENT SITUATION OF THE STACK GAS DENITRIFICATION TECHNIQUE. *(Haien dasho gijutsu no genkyo ni tsuite). Text in Japanese. Kagaku Kogaku (Chem. Eng.), 39(9):511-513, 1975. 1 ref.*

Future trends in denitrification were studied, based on reports covering the period up to the end of 1974 published by the Environment Agency. Problems in the denitrification of boiler combustion gas containing 120-200 ppm of nitrogen oxides include the presence and interference of sulfur oxides and dust. The most important denitrification processes; the dry method by catalytic reduction using ammonia and by activated carbon adsorption, and the wet method by oxidation absorption using potassium permanganate, sodium chlorite, and zone are reviewed, with advantages and disadvantages of each method. The denitrification cost estimated for reducing NOx concentration from 180 ppm to 30 ppm in flue gas at 100 N cu m/hr, 50 C and yearly operation time of 8000 hr by the NH_3 catalytic reduction method is $16.00/kl of power generating fuel. The cost by the O_3 oxidation absorption method is even higher at present. Items for future development include long lasting an inexpensive catalysts, catalysts that can withstand dust, high efficiency heat exchangers with minimal leakage, and dust collectors for high temperature flue gas (in the case NH_3 reduction method), and improvement in O_3 production efficiency, reduction of equipment costs, development of liquid phase reduction catalysts, and removal processes for nitrate ion in waste water treatment (in the case of the wet method).

54902 **APTIC NO. 79576**

(Inventor not given.)

FILTER FOR ELECTROSTATIC PRECIPITATOR. *(Denki shujinyo firuta). Text in Japanese. (Chiba, Shigeo (Japan)) Japan. Model Util. Sho 50-20392. 2p., June 20, 1975. (Appl. Nov. 25, 1970, 1 claim).*

An electrostatic dust collecting filter using metal and fiber as materials is described. Nets or pierced plates of electrically conducting metals, such as aluminum, iron, or copper were planted with one or more than one kind of synthetic or natural (organic or inorganic) fibers. The fibers were planted at a given direction on both sides of the net or plate. The fiber-planted metal net or plate were bent into a vortex-type or a snake-type with the planted fibers intersecting one another. Dusts from the ionization chamber of the electrostatic precipitator were allowed to precipitate on the densely planted fibers. The device has the advantages of high dust collecting efficiency and of easy cleaning.

1974

54903 **APTIC NO. 77190**

Adachi, J.

POLLUTION CONTROL MEASURES IN THE TAIHEIYO COMPANY: FOCUSING ON ROOF DUST REMOVAL DEVICES. *(Waga sha no kogaitaisaku: Kenoku shujinsochi o chushin to shite). Text in Japanese. Chuko to Tanko (Cast. Forg. Steel), no. 255:16-18, Oct. 1974.*

A dust removal device for the roof of an electric furnace having a 30-ton capacity was considered by Taiheiyo Kinzoku Co. The company has direct suction dust removal equipment and roof dust removal equipment. The roof dust removal equipment is used for removal of partides which cannot be removed by direct suction equipment, e.g., the removal of dust produced in cast iron works. The apparatus was also selected for economical reasons and for the prevention of pollution. Dust particles pass rapidly between a discharging electrode and a dust accumulation electrode. The charged particles attach to the latter and are washed out with water several times a day. The dust is separated from the water in a sedimentation tank. This apparatus is easy to install, does not require much space, is non-polluting and does not require much electricity or water.

54904 **APTIC NO. 79214**

Akimoto, Shinkichi

FLUE GAS DESULFURIZATION BY THE MAGNESIUM HYDROXIDE METHOD. *(Suisanka maguneshiumu-ho ni yoru haien datsuryu). Text in Japanese. Sekko to Sekkai (Gypsum Lime), no. 131:23-27, 1974.*

Flue gas desulfurization at pulp mills, metal smelting works, and oil refineries by the magnesium hydroxide method is described. Flue gas from smelting works, which contains as much as 3 g/cu m of dust, was first treated by a cyclone. The resulting gas was washed with water and the washing water was treated with $Mg(OH)_2$. Magnesium hydroxide slurry (5%) was pumped to the absorbing tower and the L/G ratio was kept at 5 l/N cu m. A desulfurization rate up to 98% was achieved and the sulfur dioxide was recovered as magnesium sulfite hexahydrate. Recovery of SO_2 as magnesium bisulfite at pulp mills has more advantages recovery as $CaSO_3$ hemihydrate. The $Mg(HSO_3)_2$ can be used for digestion of wood chips at pH 3.3 to 4.5 and 160-170 C while digestion with $CaSO_3$ requires stronger conditions. The $Mg(OH)_2$ method for flue gas desulfurization at pulp mills also has the advantage of complete recovery of waste liquid, 90-95% SO_2 recovery, and 80-85% MgO recovery.

54905 **APTIC NO. 79157**

Anderson, J. E.

THE OXYGEN REFUSE CONVERTER - A SYSTEM FOR PRODUCING FUEL GAS, OIL, MOLTEN METAL AND SLAG FROM REFUSE. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla, 1974, p. 38-39 and 337-346. 2 refs. (May 12-15.)*

An oxygen furnace converter for producing fuel gas, oil, molten metal, and slag from refuse is described along with performance data from a 5 ton/day pilot plant. The heart of the system is the oxygen converter which is a shaft furnace for converting refuse into fuel gas and a stream of molten metal and glass. Off gas can be cleaned immediately upon leaving the shaft furnace, thus taking advantage of the low gas volume which allows for the size of the gas cleaning equipment to be reduced. The fly ash in the off gas before gas cleaning is 0.02-0.05 grains/ standard cu ft (corrected to 12% carbon dioxide) for the 5-ton/day pilot plant; after gas cleaning, this value is reduced to 0.008 grains/standard cu ft. Fly ash emissions after cleaning in a full scale plant are expected to be an order of magnitude lower than Federal requirements. Carbon monoxide, methane, acetylene, ethylene, and ethane values for the dry gas from the pilot plant range from 44.3-53.2, 2.9-3.1, 0.3-1.3, 0.6-1.7, and 0.1-0.3 vol%, respectively.

54906 **APTIC NO. 77195**

Asai, Takeji and Jun Takeuchi

DESULFURIZATION BY NACHI DUST COLLECTOR (RAKUSUTA). *(Nachi dasuto rakusuta ni yoru datsuryu). Text in Japanese. Fujikoshi Giho (Fujikoshi Eng. Rev.), 30(3):23-28, 1974.*

Desulfurization units for heavy oil boilers used in the generation of electric power were constructed on the basis of the results of experiments on desulfurization of waste gas from combustion of heavy oil employing the Nachi dust collector (rakusuta). The experiment was conductd in two parts. In experiment I, a washing solution was provided from below the solution surface while high pressure air was sprayed for agitation of the washing solution in a hopper, whereas in experiment II the washing solution came from the bottom of the hopper and was agitated without high pressure air being sprayed. A 76% desulfurization rate was achieved at 135 C with 27.7 sq m/min flow velocity and a pressure loss corresponding to 162 mm of water. A 5% removal rate was obtained with less flowing gas and higher pressure loss. The correlation between the pH of the washing solution and the desulfurization rate was obtained. The sulfur dioxide removal rate varied drastically in the range of five to six. If optimum conditions were arranged, a higher SO_2 removal rate could be obtained since there exist mutual interactions among chemical equivalence, concentrations of washing solutions, ratio of solution volume to that of gas, and size of particles of chemical agents. On the basis of the above experimental results the Nachi dust collector (rakusuta) was adopted for desulfurization of waste gas from heavy oil boilers constructed in Key West City, Fla.

54907 **APTIC NO. 79160**

Back, Donald E.

IN-PLANT MODIFICATIONS OF THE METROPOLITAN DADE COUNTY NORTHEAST INCINERATOR. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla., 1974, p. 109-113. (May 12-15.)*

Operating experience with the Dade County Northeast municipal incinerator is described. An electrostatic precipitator was used to control fly ash emissions from the 300 ton/day incinerator. Operating problems involving oscillation of the precipitator inlet temperature required modifications to the inlet temperature control loop to assure that the temperature of gases exiting from the secondary combustion chamber at 1900 F were cooled to 400 F before entering the precipitator. A field repairable two mode controller using a conventional thermocouple sensing element was installed in order to eliminate the temperature control problems. Other modifications to the system included remachining the electrostatic precipitator rapper hammers for additional clearance on the rapper shafts and the installation of a new fly ash removal system which allows fly ash to settle in a quench tank before it is removed by a drag conveyor.

54908 **APTIC NO. 79185**

Barber, J. C. and H. L. Faucett

CONTROL OF NITROGEN OXIDE EMISSION FROM NITRIC ACID PLANTS. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 17, p. 269-282. 10 refs.*

The Tennessee Valley Authority has produced 65% nitric acid for nitric phosphate fertilizers and studied nitrogen oxides recovery at two small pressure units and a large pressure unit.

Significant improvements resulted in entrainment removal. The ambient standard for nitrogen dioxide is 100 micrograms per cubic m of air (0.05 ppm) for the annual arithmetic mean value. The emission standard for new HNO3 plants is 3.0 lb NO2 per ton of HNO3 produced. Visible air pollutants may only be released for 2 min in any 1 hr. The groundline concentrations of NO2 were calculated for various assumed emission rates at the large pressure unit. The maximum was substantially lower than the national ambient standard. The maximum 5 min peak was 222 micrograms per cubic m at an assumed emission rate of 25 lb NO2 ton of HNO3 produced, but this is not considered harmful for short term. Only two abatement processes, catalytic combustion and molecular sieve adsorption, are sufficiently developed to warrant primary consideration for the TVA units. The installation and operating costs are summarized. The TVA will replace nitrate based fertilizers with urea based fertilizers, so that lower concentration HNO3 will be suitable and only one unit will be needed. Plant test results indicate that the NOx emission can be limited to the maximum allowable level of 5.5 lb NO2 per ton of 57 to 58% HNO3 produced, using process cooling water near 50 F. The necessary modifications involve the absorption column cooling water system and the product acid bleaching system.

54909 **APTIC NO. 78988**

Barthel, Yves, Sigismund Frankowiak, Phillipe Renault, Andre Deschamps, Pierre Bonnifay, and John Andrews

THE TECHNOLOGY OF CLAUS UNIT TAIL GAS CLEAN-UP WITH THE IFP PROCESS. *Gas Process. Assoc., Gas Process. Assoc. 53rd Annu. Conv. Proc., Denver, Colo., 1974, p. 126-129. 1 ref. (March 25-27.)*

The IFP (Institut Francais du Petrole) process for treating Claus unit tail gas is described. The process is an extension of the Claus reaction itself and involves subjecting the effluent from an ordinary Claus unit to a catalyzed Claus reaction in polyethylene glycol containing a homogeneous proprietary catalyst at a temperature (250-270 F) low enough to prevent vaporization of the molten sulfur. Since no water is involved, ordinary carbon steel may be used for construction. IFP units may be designed for 60-93% conversion, with the latter figure corresponding to 800 ppm sulfur dioxide in the stack gas. The actual conversion depends on the hydrogen sulfide/SO2 ratio in the feed. IFP units are relatively insensitive to changes in feed flow rate and may be operated continuously for up to 24 mo. Tabulations of investment and utilities costs and SO2 conversion as a function of design variables are provided.

54910 **APTIC NO. 79156**

Bielski, E. T. and A. C. J. Ellenberger

LANDGARD FOR SOLID WASTES. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla, 1974, p. 36-37 and 331-336. (May 12-15.)*

The design and operation of pilot plant and proposed full scale versions of the Landgard solid waste disposal system are described. The main features of the system are shredding, pyrolysis of solid waste material, and resource recovery in the form of steam and solid products. Off gas analyses for a 35 ton/day pilot plant reveal carbon monoxide, methane, and ethylene levels of 6.6, 2.8 and 1.7 vol% (dry basis), respectively. The quantity of particulates in the pyrolysis off gases is inherently low due to the low volume of gas in contact with the solids bed and the absence of underfire air. The average particulate loading in the off gas is 0.027 grains/ standard cu ft (dry gas). Hydrocarbon and odor emissions are controlled by thoroughly mixing kiln off gas with combustion air ahead of a gas purifier and maintaining a minimum gas purifier temperature of 1500 F. Gases leaving the kiln contain a significant amount of hydrogen, carbon monoxide and light hydrocarbons. These gases are burned in a gas purifier vessel and are then passed to an adiabatic wet gas scrubber. A 1000 ton/day municipal waste plant is under construction in Baltimore.

54911 **APTIC NO. 79480**

Boki, Keito

STUDIES ON THE ADSORPTION REMOVAL OF HYDROGEN SULFIDE GAS. 5. BASIC STUDIES ON PRACTICAL USES OF ADSORBENTS FOR REMOVAL OF HYDROGEN SULFIDE GAS. *(Ryuka suiso gasu no kyuchaku jokyo ni kansuru kenkyu. 5. Ryuka suiso gasu kyuchaku jokyozai no jitsuyoka no tame no kisoteki kenkyu). Text in Japanese. Shikoku Igaku Zasshi (Shikoku Acta Medica), 30(6):344-349, Dec. 1974. 12 refs.*

Basic information on practical uses of adsorbents for removal of hydrogen sulfide gas was obtained by measuring the effective service time of adsorbents for the gas (H2S gas and dry air), and the concentration of H2S remaining in the model room (1 m times 1 m times 2 m high). Thirty-two kinds of adsorbents were used: 10 kinds of silicates; 10 kinds of activated carbon; 12 kinds of zeolites. Roughly linear relationships were found between the effective service time of adsorbents measured dynamically, and the amount of H2S adsorbed measured statically. Longer effective service time of adsorption was present for the following: 2 kinds of magnesium silicates (SiO2/MgO, 1.62 and 2.28); 3 kinds of active carbon; 3 zeolites (synthetic zeolite F-9, molecular sieve 13X; molecular sieve 5A for gas chromatography). Adsorbents with longer effective service time removed H2S gas more effectively in the model room. More H2S (30 C; 50 mm Hg; times 10,000 mg/kg was adsorbed on zeolites (synthetic zeolite F-9 (10,290)) than on activated carbon (3880). However, effective service times (200 ml/sq cm min; H2S, 8000 ppm) were roughly the same: F-9, 70-64 min; activated carbon, 69-55 min. (Author abstract modified)

54912 **APTIC NO. 79186**

Bradstreet, Jeffrey W. and Robert J. Fortman

STATUS OF CONTROL TECHNIQUES FOR ACHIEVING COMPLIANCE WITH AIR POLLUTION REGULATIONS BY THE ELECTRIC UTILITY INDUSTRY. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 18, p. 285-305. 25 refs.*

The ability of electric utilities to select control equipment that will afford compliance with the Federal air pollution regulations is quite limited. It is possible to control particulates to the extent required with the possible exception of low sulfur fuel used to limit sulfur oxide emissions. Flue gas desulfurization processes have not developed sufficiently to provide reliable removals consistent with the operation of the boiler. Nitrogen oxide control has only advanced to combustion modification techniques for gas fired units, and possibly oil fired units. Control of nitrogen oxide emissions from coal fired units is an undeveloped art. Compliance with the nitrogen oxide emissions is, therefore, impossible for coal fired plants. (Author abstract modified)

54913 **APTIC NO. 78989**

Cameron, L. C. and Pierre Grancher

SULFREEN PROCESS: STATUS OF DEVELOPMENT. *Gas Process. Assoc., Gas Process. Assoc. 53rd Annu. Conv. Proc., Denver, Colo., 1974. p. 130-133. (March 25-27.)*

The Sulfreen process for the desulfurization of flue gas is described. The basic reaction of the process is the Claus reaction which occurs over a solid catalyst at a temperature of 260-300 F and a pressure of 1.4-1.7 psig. The thermodynamic equilibrium of the reaction is more favorable at this low operating temperature than under normal Claus conditions, and the sulfur produced remains adsorbed on the catalyst in liquid form, thus displacing the Claus equilibrium toward the complete conversion of hydrogen sulfide and sulfur dioxide into sulfur. This results in a higher sulfur recovery efficiency than can be achieved with conventional Claus plants. The plant consists of one or several parallel reactors filled with conventional Claus catalyst. The tail gas after passing through the reactor is incinerated in the normal manner prior to being released to the atmosphere from the stack. The process results in an overall sulfur conversion of 99%. The H2S and SO2 concentration in the treated gas is 2500 ppm, and the SO2 concentration in the stack after incineration is 1500 ppm under normal conditions.

54914 **APTIC NO. 79158**

Chapman, Richard A. and F. Richard Wocasek

CPU-400 SOLID-WASTE-FIRED GAS TURBINE DEVELOPMENT. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla, 1974, p. 40 and 347-357. (May 12-15.)*

The development and operation of a solid waste-fired gas turbine pilot plant are described. The plant consists of a fluidized bed combustor which produces combustion products that are passed through a gas turbine to drive an electrical generator. The combustion power unit is capable of consuming 400 tons/day of solid waste, and a 70 ton/day pilot plant is currently in operation. A three-stage cyclone separator is used to control particulate emissions from the fluidized bed combustor, although plans are underway to replace the third stage of the cyclone with a granular filter in order to increase particle collection and protect the turbine. The total particulate loading for the turbine exhaust amounts to 0.0405 grains/ standard cu ft. The unit is capable of 99% combustion efficiency at a solid waste feed rate of 100 lb/min, resulting in 1000 kW of power being generated. Carbon monoxide, hydrocarbon, sulfur dioxide, nitrogen oxide and hydrogen chloride levels in the exhaust gas are less than 30 ppm, 2 ppm, less than 35 ppm, 100 ppm and 63 ppm, respectively.

54915 **APTIC NO. 79180**

Clark, David

CONTROL OF EMISSIONS IN THE CEMENT MANUFACTURING INDUSTRY. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 11, p. 173-179.*

Emission control in Portland cement manufacturing is discussed as it relates to attainment of ambient air and point source mass emission standards. The processes for reducing particulate emissions from the procurement of raw materials are described. The feeders used for mixing raw materials are generally controlled sufficiently using shrouds and conveyor shields. A wet scrubber is the most commonly used dust control equipment in the wet process raw grinding operation and may also be used to control emissions from the mixing stage. The raw grinding stage has an exceptionally high mass emission potential in the dry process. Continuous temperature control is necessary to avoid blinding the fabric filters used to control emissions while drying the raw materials. The exhaust gases from the burning phase and the quick cooling operation following it are the most difficult conditions in the control of emissions from the entire process. The control methods used include electrostatic precipitators and fabric filters. Fabric filters are the mainstay of emission control from finish grinding. The fabric filter is also the most used collection device in cement storage and distribution. Although large quantities of fine material are transferred through this step, proper application of transfer points shrouds and conveyor covers, the use of high level silo alarms to avoid silo overfill and adequately sized fabric filters, minimize the emission of cement dust.

54916 **APTIC NO. 77107**

Davids, Peter

FLUE GAS SCRUBBING FOR COMBUSTION EQUIPMENT: WATER POLLUTION IS AVOIDABLE. *(Abgaswaesche bei Feuerungsanlagen: Gewaesserbeeintraechtigungen sind vermeidbar). Text in German. Luftverunreinigung, p. 42-48, 1974. 16 refs.*

Waste water problems in connection with flue gas scrubbing in combustion equipment and waste incinerator plants are discussed. Flue gas scrubbing for joint separation of particulates and gases, such as sulfur dioxide, requires less initial expenditure but entails higher operating costs than separate removal. Hydrogen chloride present in waste incinerator flue gases can be efficiently separated by means of spray scrubbers, venturi scrubbers, filled scrubbers, and wet cyclones because of its high solubility in water. Recirculation and countercurrent absorption helps reduce the water consumption for the removal of HCl from waste incinerator flue gases to or below 0.2 cu m/ton of waste. The flue gases generated in a large-capacity, coal-fired power plant are reduced to a residual dust concentration of 600 mg/cu m by means of an electrostatic precipitator before they are scrubbed with lime suspension for the removal of SO2. In another flue gas desulfurization process, activated carbon is used for the adsorption of SO2, and for the subsequent regeneration of the adsorbent during which process commercial gypsum or SO2-rich gas can be obtained.

54917 **APTIC NO. 79188**

Duignan, Henry F.

PROCUREMENT APPROACHES TO OBTAIN HIGH QUALITY PRECIPITATOR SYSTEMS. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 20, p. 321-344.*

A plan is offered for electrostatic precipitator procurement which considers the interests of buyers and sellers alike, and entails the pursuing of those interests through mutual cooperation. It determines the elements of a precipitator design and provides for encouraging and taking advantage of the desirable elements. Its approach aims to control risk in contracting on both sides, and allow for acquisition of the systems necessary to meet stringent emission control standards prescribing continuous operations. It reduces the risks inherent in the design of electrostatic precipitator systems that will work at better than 99% efficiency and reliability. It includes the operations and maintenance phase. (Author abstract modified)

54918 **APTIC NO. 79154**

English, J. A., II

DESIGN ASPECTS OF A LOW EMISSION, TWO-STAGE INCINERATOR. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla, 1974, p. 31-32 and 311-319. 7 refs. (May 12-15.)*

The design and operation of a low emission, two-stage, starved-air incinerator are described. Raw waste is fed into the first stage, or primary chamber, which is a large refractory lined shell. A fraction of the waste is oxidized and releases heat which causes the endothermic pyrolysis of the volatile fraction of the waste, resulting in a dense combustible smoke. The air flow rate into the first stage is carefully metered and is less than the stoichiometric rate required for complete combustion of the waste. The smoke then passes from the first stage to a second stage where additional air and pilot fuel are added. The mixture is ignited, and the smoke is oxidized. The second stage can be thought of as a gas burner which uses smoke as the fuel. Particulate emissions from the incinerator are below 0.05 grains/ standard cu ft (corrected to 50% excess air), and its operation is smoke-free and from start-up to burn down.

54919 **APTIC NO. 79050**

Faure, F., R. B. Jacko, and R. Squires

THE COLLECTION EFFICIENCY OF AN ELECTROSTATIC PRECIPITATOR FOR TRACE METALS FROM AN OPEN HEARTH FURNACE. *National Science Foundation, Washington, D. C., Research Applied to Na-*

tional Needs, Trace Contam. Conf. Proc. 2nd Annu., Pacific Grove, Calif., 1974, p. 64–68. 3 refs. (Aug. 29–31.)

NTIS: LBL-3217

Emissions tests both upstream and downstream of an electrostatic precipitator controlling a battery of seven open hearth furnaces revealed an average particulate collection efficiency of 97.7%. An apparent minimum collection efficiency at the 4 micron particle size level appeared to be due to the transformation of particle sizes within the precipitator. Agglomeration of 1-micron particles to an effect 4-micron size appeared to be the primary reason for the pseudo efficiency decrement at 4 micron. Average particulate concentrations upstream and downstream of the precipitator were 0.349 and 0.008 grains/standard cu ft, respectively. Total particulate mass emission rates varied from 35-94 lb/hr and resulted in a calculated emission factor of 0.16-0.46 lb particulates/ton of steel produced. The mass median diameter of the particles entering the precipitator was 1.56 micron and that of the particles leaving the precipitator was 1.0 micron. (Author abstract modified)

54920 **APTIC NO. 76957**

Fukuzawa, Hisashi and Yoshumi Ishihara

CATALYTIC REDUCTION OF NITROGEN OXIDES BY AMMONIA. (PART I). EVALUATION ON CATALYST ACTIVITY. *(Anmonia ni yoru chisso sankabutsu no seshoku kangen. (sono I) Shisaku shokubai no kassei hyoka). Text in Japanese. Denryoku Chuo Kenkyusho Gijutsu daiichi Kenkyusho Hokoku (Tech. Lab. of Central Res. Inst. (No. 1) Electric Power Ind. Rept.), no. 74022:1-19, Aug. 1974. 12 refs.*

A fixed-bed catalytic reactor was used to evaluate the NOx reduction activities of various catalysts with ammonia as the reducing agent. A gas mixture containing 220-260 ppm nitric oxide 300-350 ppm NH3, molecular and atomic oxygen or 1100 ppm sulfur dioxide, carbon dioxide, water and nitrogen was introduced into the reactor at 100-500 C. Six catalysts including 7.5% chromium alumina supported), 5.6% vanadium (Al2O3 supported) 5% copper-3% chromium (Al2O3 supported), 5% iron (Al2O3 supported), 5% cobalt-3% Cr-2% nickel (Al2O3 supported), and 5% Cu (bauxite supported) showed more than 80% denitrification at temperatures ranging from 300 C to 350 C in the presence of SO2 and from 120 C to 300 C in the absence of SO2. Copper catalysts with molded bauxite as the support showed significantly higher activity than those with bauxite chips, alumina, silica, or other mineral materials as supports. Vanadium, Cr. and Co catalysts showed high activities even in the presence of SO2, while Fe and Co catalysts gave high activities only in the absence of SO2. Modification was necessary for application of the catalysts to denitrification of flue gas which contained a fairly high concentration of particulates.

54921 **APTIC NO. 78187**

Greco, Joseph and J. A. Hudson

SPECIFICATIONS FOR HIGH EFFICIENCY ELECTROSTATIC PRECIPITATORS FOR COAL-FIRED STEAM-ELECTRIC GENERATING PLANTS. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 19, p. 307-319.*

The Tennessee Valley Authority has conducted acceptance tests on electrostatic precipitators for its coal fired generating units. Some of the principal factors for which the test program and performance and reliability monitoring have dictated more rigorous and definitive specifications are discussed. Specifications for high efficiency electrostatic fly ash collectors must include adequate definition of the requirement for operating conditions, minimum acceptable sizing parameters and sectionalization, inducements which encourage manufacturers to provide conservatively designed electrostatic precipitators, and generously designed ash removal system with sufficient capability to evacuate the precipitator hoppers every 4 hr. The electrode design must be such that electrode failures are infrequent. Should one fail, the construction should be such that it will not cause an electrical short. Long term, high level performance of the precipitator is dependent upon an effective rapping system. Its design should be simple and such that malfunctions seldom occur. The rapping system must do an effective job of removing the accumulated ash from the collection and discharge electrodes. Precipitators must be designed for a high level of performance and must operate for 12 to 18 mo with little or no maintenance in order to meet state and Federal requirements with regard to particulate emission. (Author abstract modified)

54922 **APTIC NO. 79464**

Green, Ellis, J.

PROCESS FOR REMOVING ACID GASES FROM A GAS STREAM. *(Stone and Webster Engineering Corp., Boston, Mass.) U. S. Pat. 3,829,521. 8p., Aug. 13, 1974. 6 refs. (Appl. July 3, 1972, 15 claims).*

A system for removing hydrogen sulfide and carbon dioxide from hydrocarbon gas streams is described that reduces the rate of fouling in the elevated temperature section of an amine absorption system. The system comprises a conventional acid gas absorber that is designed to receive the gas to be treated at the bottom, while a lean aqueous amine solution is injected at a point near the top and directly below a water wash section. Regeneration of the amine solution is accomplished by the following steps: coalescing and separating liquid four-carbon and heavier hydrocarbons entrained in the amine solution, filtering solid particles from the amine solution, stripping almost all of the four-carbon and heavier unsaturated hydrocarbons remaining in the amine solution, and finally stripping at elevated temperatures the acid gases from the amine solution by conventional means. (Author abstract modified)

54923 **APTIC NO. 79182**

Harpel, William L. and K. Robert Lange

WATER TREATMENT CHEMICAL APPLICATION TO GAS SCRUBBER SYSTEMS. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 13, p. 195-209. 19 refs.*

Successful applications have demonstrated that water treatment chemicals can be of substantial benefit in some types of scrubber systems for alleviation of problems such as corrosion, fouling, scale formation, and foaming. Polymeric flocculant aids are of value to enhance the performance of many types of scrubber thickeners. Where foaming problems exist, antifoams can be economically applied to eliminate such problems. Some progress has been made with the application of corrosion inhibitors to scrubber systems. Fouling and scaling are major problems in many types of scrubber systems. Deposit control agents are of definite value for reducing the rate of deposit buildup in some types of scrubber systems. The systems discussed include blast furnace scrubber systems, scrubber systems for other types of steel plants, aluminum plant scrubber systems, and boiler flue gas scrubber systems. (Author abstract modified)

54924 **APTIC NO. 79165**

Hemsath, Klaus H., Arvind C. Thekdi, and Frank J. Vereecke

ENERGY RECOVERY THROUGH INCINERATION IN PAINT DRYING PROCESS. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla., 1974, p. 271-279. 4 refs. (May 12-15.)*

An inert gas paint drying process that reduces fuel consumption and air pollution is described. A special incinerator utilizes the chemical energy of the solvents to incinerate oxygen-free fumes from the oven and produce high temperature inert gases. Part of the inert gases ccan be recycled to the oven, while additional gases can be used as a source of heat for the drying oven and other auxiliary operations. The basic process and incinerator design can also be used in many other processes in which high Btu vapors are released.

54925 **APTIC NO. 79179**

Henderson, J. S. and J. E. Roberson

THE PULP AND PAPER INDUSTRY PRECIPITATOR SURVEY. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 10, p. 161-172, 3 refs.*

A precipitator survey was conducted, covering collector units placed in operation since January 1, 1966, and with a collection efficiency of at least 98.0%. The survey questioned design data, collector construction, collector performance, and operating experience. Maintenance costs, problem areas, and stack test results were included. Responses covered 20 wet bottom precipitator units applied to conventional recovery boilers and four dry bottom precipitators as applied to noncontact recovery boilers. The performance aspects of precipitators are discussed. Inlet particulate loadings consist of a range of values. Approximately 70% of the precipitator tests were at less than guaranteed efficiency. A 99.0% guaranteed efficiency resulted in a long term operating efficiency of 98.4%. Only half of the respondents kept specific maintenance cost records on their precipitators, while 75% of the respondents have performed both guaranteed tests and routine operating tests of their precipitators. The results for the dry bottom precipitators parallel those of the wet bottom precipitators except for downtime and maintenance costs. Downtime attributed to dry bottom averaged 220 hr versus 30 hr per yr for wet bottom units. Corresponding maintenance costs were higher for dry bottom units. (Author abstract modified)

54926 **APTIC NO. 79155**

Hescheles, C. A. and R. F. Bonner, Jr.

ULTIMATE DISPOSAL OF WASTES BY PYROLYSIS AND INCINERATION. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla, 1974, p. 33-35 and 321-330. (May 12-15.)*

A proposed system for the disposal of liquid/fluid wastes from industrial processes and wastewater treatment plants in the Greater Cincinnati, Ohio area is described. Wastes are pumped into storage tanks and blended to produce a liquid with a calorific value capable of undergoing pyrolysis and incineration without use of supplementary fuel. The thermal reduction unit includes a rotary kiln, cyclone furnace, combustion chamber, high-energy venturi scrubber, and an induced draft fan. Particulate removal, as well as an initial stage of sulfur dioxide removal, is accomplished in the venturi scrubber. Flue gases from the venturi pass up through a two-stage absorber where a sodium carbonate slurry contacts the gas for the removal of SO2 and hydrochloric acid. Scrubber flue gases continue to flow upward from the absorber to a demister for removal of water droplets. The gases are drawn from the demister by an induced draft fan and discharged to the atmosphere through a stack.

54927 **APTIC NO. 79116**

Houseman, John and Frank W. Hoehn

A TWO-CHARGE ENGINE CONCEPT: HYDROGEN ENRICHMENT. *Preprint, Society of Automotive Engineers, Inc., Warrendale, Pa., 13p., 1974. 6 refs. (Presented at the International Stratified Charge Engine Conference, Troy, Mich., Oct. 30-Nov. 1, 1974.)*

Dynamometer test results are presented for a modified fuel system based on hydrogen enrichment for a V8 internal combustion engine. The engine burns mixtures of gasoline and hydrogen under ultralean conditions to yield extremely low nitrogen oxides emissions with increased engine efficiency. The hydrogen is produced in a compact onboard generator from gasoline and air. The hydrogen rich product gas is cooled and mixed with the normal combustion air in a modified carburetor. The engine then operates in the conventional manner on atomized gasoline with spark ignition, but with hydrogen enriched air and a high spark advance. The engine thus receives two charges of fuel: a charge of gaseous fuel from the hydrogen generator and the normal gasoline charge. The results on hydrogen enrichment are compared with the 1973 V8 baseline stock engine with emission controls, and the same engine without controls and operated at maximum efficiency under lean conditions. All results are compared at level road load as a function of revolutions per min. The lean combustion limit of the stock engine was extended with hydrogen enrichment to an equivalence ratio of 0.54 and the indicated thermal efficiency increased to 39.7%. Durability of the engine and hydrogen generator combination was demonstrated without deterioration of either component. Relative to the stock engine, an approximate 10% reduction in fuel consumption was measured over the entire level road low speed range. Nitrogen oxides emissions were reduced to below the 1977 Environmental Protection Agency standards. The hydrogen enrichment concept is compared with a prechamber stratified charge engine. (Author abstract modified)

54928 **APTIC NO. 79079**

Huenlich, Hans-Werner

STATEMENT ON CURRENT PRACTICE FOR THE REDUCTION OF FLUORIDE EMISSION IN THE BRICK AND TILE INDUSTRIES BY SCRUBBING OF THE FLUE GASES. *(Feststellung des Standes der Technik zur Verminderung der Fluoremission in der Ziegelindustrie durch Reinigung der Abgase). Text in German. Ziegelind. (Weisbaden), no. 4:155-162, 1974.*

Fluoride occurs as a trace element in fuels and in many raw materials for ceramics. It is seldom possible for it to be completely stabilized in the ceramic body during firing. An attempt is therefore made to neutralize the harmful gaseous fluoride compounds in the flue gas. A survey of the literature on the subject presents the processes used to date, both inside and outside the ceramic industries, for the conversion of the gaseous fluoride compounds in the flue gas into harmless compounds in the form of dust particles. The further development of the lime injection process and the necessary removal of the dust particles thus produced are singled out for particular emphasis. (Author abstract)

54929 **APTIC NO. 79481**

Ise, Yoshio

STUDIES ON ADSORPTION AND REMOVAL OF TRIMETHYLAMINE GAS. *(Torimechiru amin gasu no kyuchaku jokyo ni kansuru kenkyu). Text in Japanese. Shikoku Koshueisei Gakkai Zasshi (J. Shikoku Soc. Public Health), 19(2):76-91, Nov. 1974. 31 refs.*

Experimental studies on the adsorption of trimethylamine gas (TMAG), using 28 different adsorbents, are described. Activated carbon No. 4-F (prepared from activated carbon No. 4 at 550 C, in nitrogen gas) showed highest adsorption capacity for TMAG. By using No. 4-F adsorbent, TMAG concentration in a model room dropped from the initial value of 2.5 ppm to 0.001 ppm within 30 min. The higher the content of iron compounds in the adsorbent, the less there was of TMAG adsorption. The amount of TMAG adsorbed on active carbon treated with 1% HCl was higher than that adsorbed on non-treated active carbon. Since the heat of adsorption was below 6.78 kcal/mole, the adsorption of TMAG seemed to be a physisorption. The original adsorption capacity of the adsorbents was regenerated by simple treatment. Time required for reaching the adsorption equilibrium was 4 to 5 min. The effect of mesh size (48-400 mesh) of the adsorbent particles (activated carbon) on the adsorption capacity for TMAG was not marked. Adsorbents with a larger static adsorption capacity for TMAG have a longer dynamically effective lifetime. (Author abstract modified)

54930 **APTIC NO. 79558**

Mago, T., S. Maseda, and I. Tabata

ON THE DEODORIZATION OF DRIED CHICKEN DROPPINGS EXHAUST. *(Keifun kanso haigasu no dashu ni tsuite). Text in Japanese. Kagoshima ken Kogyo Shikenjo Nenpo (Annu. Rep. Ind. Res. Inst., Kagoshima Pref.), no. 21:29-30, 1974.*

The effect of a catalytic deodorization system designed for a chicken droppings drier was investigated using an experimental drying and deodorization apparatus. Using Dash 200 by Nippon Engelhard Co. as catalyst at 350 C, concentrations of five malodorants were determined before and after the catalytic deodorization by gas chromatography (ammonia was determined by the indophenol method). Malodorant concentrations before and after the catalytic deodorization and removal rate of malodorants were 496.7 and 0.41 ppm and 99.9% for NH3, 0.008 and 0.002 ppm and 83% for methyl mercaptan, 0.801 and 0.340 ppm and 68.1% for hydrogen sulfide, and 0.006 and 0.0005 ppm and 92% for dimethyl sulfide, respectively. As for trimethylamine, only traces were found.

54931 **APTIC NO. 79181**

McKenna, John D. and Ralph Weisberg

A PILOT SCALE INVESTIGATION OF FABRIC FILTRATION IS APPLIED TO COAL FIRED INDUSTRIAL BOILERS. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 12, p. 181-193. 4 refs.*

Work was done to assess the techno-economic feasibility of employing fabric filters for coal fired boiler particulate control. A slip stream was taken from a coal burning boiler and delivered to a fabric filter pilot plant. Emission tests conducted on the boiler indicate the particulate emission rate to be approximately 130 lb/hr, and coal analysis indicated the percentage sulfur to be about 0.6%. Pilot plant tests were conducted on Nomex felt, Gore-Tex, and Teflon woven. Efficiencies greater than 99% are achievable. Operating pressure drops of 4 to 6 in. appear possible at air-to-cloth ratios of six to one. It is not possible to employ Nomex without employing a technique for eliminating acid condensation. The use of Teflon felt appears economically possible if good removal efficiencies and reasonable pressure drops are obtained at any air-to-cloth ratio of six to one or greater. Teflon felt was the most expensive to install for all three air-to-cloth ratios investigated and Gore-Tex the least expensive for the same air-to-cloth ratios. All the bag materials studied have annualized cost below that of an electrostatic precipitator operating at 99% efficiency at air-to-cloth ratios of 7.5 and greater. (Author abstract modified)

54932 **APTIC NO. 79466**

Morin, Albert Z.

METHOD OF AND APPARATUS FOR REDUCING POLLUTION CAUSED BY EXHAUST GASES OF AN INTERNAL COMBUSTION ENGINE. *(Assignee not given.) U. S. Pat. 3,831,377. 4p., Aug. 27, 1974. 9 refs. (Appl. July 24, 1972, 3 claims).*

An apparatus for reducing exhaust emissions of particulates and gaseous hydrocarbons, nitrogen oxides, and carbon monoxide as well as for cooling the discharged gases to ambient temperature to reduce smog formation is described. The device employs a closed circuit cooling system to reduce the temperature of the exhaust such that its volume is contracted. The gaseous vapors are condensed to liquid form, and the liquid is then drained off. The dewatered gases are filtered to remove particulate components. The filtered gas is stratified, with the lighter more volatile gases being conveyed to the engine fuel intake. The residual fraction of the cooled, contracted gas is discharged to the atmosphere. Additionally, any volatile fumes rising off the liquids collected from the exhaust flow may be fed to the engine fuel intake. The closed circuit cooling system includes a radiator separate from the engine's usual radiator and an engine-operated pump for driving the coolant in the system. (Author abstract modified)

54933 **APTIC NO. 78990**

Naber, Jaap E., Johannes A. Wesselingh, Willem Groenendaal, and D. E. Dodd

THE SHELL CLAUS OFF-GAS TREATING PROCESS. *Gas Process. Assoc., Gas Process. Assoc. 53rd Annu. Conv. Proc., Denver, Colo., 1974, p. 120-125. 6 refs. (March 25-27.)*

The Shell Claus Off-Gas Treating (SCOT) Process is described. Thee process is designed to remove residual sulfur compounds present in the off gas of sulfur recovery units of the Claus type. Sulfur removal is achieved in two stages: a reduction stage in which all sulfur compounds and elemental sulfur in the Claus off gas are reduced to hydrogen sulfide and an absorption stage in which, after water removal by condensation, hydrogen sulfide is selectively removed by amine absorption/regeneration and is recycled to the Claus unit. Total sulfur recovery with the process can be increased to above 99.8%. Changes in the feed gas composition exert only a small effect on the overall sulfur recovery. The process produces no secondary waste streams. (Author abstract modified)

54934 **APTIC NO. 79153**

Pepperman, Cecil M.

THE HARRISBURG INCINERATOR: A SYSTEMS APPROACH. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla., 1974, p. 24-25 and 247-253. (May 12-15.)*

Operational experience with a 600 ton/day municipal incinerator is described. The incinerator consists of two refuse burning systems, each of which includes a charging hopper and chute, a multi-pass furnace boiler with gas-tight welded membrane waterwalls, and an electrostatic precipitator for fly ash control. The precipitators are designed for a maximum raw gas temperature of 525 F and gas velocities not exceeding 3.5 ft/sec. Dust loadings range from 0.050 to 0.120 lb/1000 lb of gas (corrected to 50% excess air). The average efficiency of precipitator collection is 95%. Steam is generated by the incinerator at an average rate of 120,000 lb/hr and is used in the plant for undergrate combustion air preheaters, a deaerating feed water heater, sootblowers, building heat, and a turbine drive for the shredder. Plans are also underway to use steam from the incinerator for the heat-treating and drying of sludge which in turn is to be injected into furnaces and burned to generate more steam.

54935 **APTIC NO. 79195**

Powell, J. David and Mont Hubbard

CLOSED-LOOP CONTROL OF INTERNAL COMBUSTION ENGINE EXHAUST EMISSIONS (FINAL REPORT). *Stanford Univ., Stanford, Calif., Dept. of Aeronautics and Astronautics, Dept. of Transportation Contract DOT-OS-30111, 63p., Feb. 1974. 12 refs.*

NTIS: PB 239 850

One of the most important variables affecting automotive engine emissions is the fuel-air ratio, which is initially maintained to about 3 to 5% but degrades with time. Several different sensors to be used in the exhaust for measurements of the air-fuel ratio and closed loop control techniques for maintaining better accuracies of the air-fuel ratio were investigated. A pyroelectric sensor based on the infrared radiation of carbon monoxide and carbon dioxide was highly skewed in the CO band by the exhaust water content and therefore considered unacceptable. A Taguchi Gas Sensor was tested on a laboratory engine, partly as an element in a closed loop controller, and found to possess a large degree of drift from day to day. This sensor was therefore also considered unacceptable. A laboratory model of a zirconia oxygen sensor was tested and found to be highly repeatable and insensitive to other engine variables although some sensitivity was exhibited to temperature. Closed loop control was implemented on a laboratory engine for both stoichiometric and lean fuel-air ratios. Air-fuel ratio accuracies of 1% or less were readily achievable in the presence of conceivable disturbances. Engine modeling is also discussed. (Author abstract modified)

54936 **APTIC NO. 79017**

Ramanan, R. and M. R. Chivate

REMOVAL AND RECOVERY OF NITROGEN OXIDES (NOX) FROM GASEOUS EFFLUENTS. *Indian Chem. J. (Bombay), 9(1):13-21, July 1974. 41 refs. (Presented at the Chemical Engineering Association Conference on Waste Disposal and Waste Utilization, Powai, March 3, 1973.)*

Methods for the removal and recovery of nitrogen oxides from various emission sources are reviewed. Major contributors to NOx emissions are fossil fuel combustion processes, nitric acid plants, and automobiles. Two stage combustion is effective in suppressing NOx formation at stationary combustion sources. Catalytic afterburners and fuel additives are close to being a practical solution to the control of NOx emissions from automobiles. Any one of three removal systems, absorption, adsorption, or catalytic combustion, may be economical for reducing NOx emissions from HNO3 plants, depending on particular circumstances. Catalytic combustion is presently the most attractive NOx abatement since it also recovers heat economically and does not involve any secondary disposal problem.

54937 **APTIC NO. 79221**

Rayna, J.

DUST REMOVAL AND PURIFICATION OF INDUSTRIAL GASES. *(Depoussierage et epuration des gaz de procedes industriels). Text in French. Tech. Moderne, 66(4):24-27, 1974.*

Waste gas cleaning equipment by Swemco and some of its applications are described. A cyclone scrubber with tangential inlet has a pressure loss between 50 and 100 mm water column, and high dust separation efficiency for the above-2-micron fraction. A venturi scrubber with a pressure loss variable between 150 and 1400 mm water column has a high separation efficiency for particles smaller than 1 micron. Plate scrubbers have efficiencies of over 98% for particles larger than 1 micron. Venturis can be combined with cyclone or plate scrubbers for increased separation efficiency. A combination of cyclone and venturi scrubber with scrubbing liquid recirculation is used for dust separation in a fertilizer plant. Plate scrubbers combined with a common stripping column are used in the pyrite roasting unit of a sulfur acid production plant. A combination of venturi scrubber and plate scrubber is used for dust separation in a waste incinerator plant.

54938 **APTIC NO. 77204**

Sano, Hiroshi

REMOVAL OF SULFUR OXIDES BY NEUTRALIZER PREMIXING INTO FUEL, III, REMOVAL OF SULFUR OXIDES FROM FLUE GAS BY INJECTION OF MAGNESIUM SALT SOLUTION EMULSIFIED WITH FUEL OIL. *(Nenryo yokongo shiki haien datsuryuho, dai 3-ho, magunesiumuen suiyoeki nyuka fukikomi shiki haien datsuryu). Text in Japanese. Osaka Kogyo Gijutsu Shikenjo Shoho(Rep. Gov. Ind. Res. Inst., Osaka), 25(4):232-235, Dec. 1974.*

The effect of the injection of magnesium salt solution emulsified with fuel oil on the reduction of sulfur oxides level in combustion gas was studied. The magnesium salts considered were magnesium formate and magnesium acetate, and fuel oils containing 5 to 30 g sulfur/l oil were combusted. The SOx reduction in the flue gas increased with the magnesium salt concentration in the fuel oil, and 50 to 95% SOx reduction was achieved upon the addition of magnesium salt solution to the fuel. For the combustion of fuel containing 30 g sulfur/l oil, the SOx level in the combusted gas was about 150 ppm when the magnesium formate concentration was 1.0 mol/l oil and the level increased to 750 ppm when the concentration was reduced to 0.5 mol/l oil. The SOx level in the exhaust gas for the combustion of oil with 20 g sulfur/l oil was 300 ppm with the magnesium formate concentration at 0.5 mol/l oil. The increase in the magnesium formate concentration in the fuel was limited because of the accompanied blockage of the burner nozzle and the reduction of combustion temperature. Therefore the use of magnesium acetate was useful, since the solubility of magnesium acetate in hot water was higher than that of magnesium formate. The magnesium acetate could be added at higher concentration to the fuel without lowering the combustion efficiency.

54939 **APTIC NO. 77254**

Sawa, N., S. Hori, and T. Iijima

AN EXPERIMENTAL STUDY ON THE EXHAUST GAS OF THE PRE-COMBUSTION CHAMBER 4-STROKE CYCLE DIESEL ENGINE. (II). *(Yonenshoshitsu 4 saikuru diizeru kikan no haiki ni kansuru jikkenteki kenkyu (II). Text in Japanese. Ibaragi Daigaku Kogakubu kenkyushuho (J. Fac. Eng. Ibaragi Univ.), no. 22:27-37, Dec. 1974. 11 refs.*

A single cylinder, pre-combustion, water-cooled, 4-stroke cycle diesel engine was used for the study of nitrogen oxides prevention. Light oil was used as the main fuel whereas anhydrous or hydrous methanol was used as auxiliary fuel. Inlet air was heated to 60 C before mixing with anhydrous methanol or hydrous methanol (60% water). Nitrogen oxides concentration and smoke density decreased remarkably as the amount of methanol increased, but heat efficiency also decreased, particularly at low load; at 25% methanol-H2O(1:9), the NOx concentration was reduced to about 50 ppm, but heat efficiency was reduced 5%; the reduction of NOx was directly related to the latent heat of the auxiliary fuel; exhaust gas recirculation (EGR) reduced NOx concentration but increased smoke density; the combination of EGR and methanol addition significantly reduced the exhaust emissions; 10-20% aqueous hydrogen peroxide reduced the NOx concentration to 30 ppm.

54940 **APTIC NO. 79164**

Serrell, M. A.

WOOD WASTE - A MODERN FUEL. *American Society of Mechanical Engineers, New York, Incinerator Div., Natl. Incinerator Conf. Resour. Recovery Thru Incineration, Miami, Fla., 1974, p. 267-270. (May 12-15.)*

The use of an existing horizontal return tubular boiler to generate steam from the burning of wood waste is discussed. An automatic oil burner provides sufficient well located heat to incinerate any smoke generated by the process and also provides automatic steam generation on an unattended basis. Fly ash components in the stack effluent can be collected with the aid of an induced draft fan and a mechanical collector. Alternatively, the fly ash and cinders may be recirculated back into the boiler for reincineration.

54941 **APTIC NO. 79467**

Stranahan, John J., John C. L. Hollier, and Huch C. Deloney

SMOKELESS GAS FLARE. *(Texaco, Inc., New York) U. S. Pat. 3,829,275. 7p., Aug. 13, 1974. 5 refs. (Appl. Oct. 26, 1971, 3 claims).*

A smokeless gas flare system which operates over a wide range of operating conditions, including flow rates that are immeasurable by conventional flow meters, is described. The system includes at least one steam aspirating gas flare and a steam control valve responsive to a very low gas flow detector. The system utilizes a knockout drum water seal, a by-pass line with an orifice run, and a water level switch for supplying an empirically set fixed flow of steam to the flare for ensuring a smokeless flame prior to the gas flow rate reaching a measurable rate. A full range flare which operates over all other gas flows is also part of the system. The flare includes several steam flow valves, each valve being empirically set to provide the proper steam-to-gas ratio throughout its respective range. The valves are responsive to several corresponding gas flow detectors for ensuring a smokeless flare as the flare gas flow varies from the immeasurable range through the measurable ranges of the detectors. (Author abstract modified)

54942 **APTIC NO. 79012**

Sutterfield, G. Wayne

REFUSE AS A SUPPLEMENTARY FUEL FOR POWER PLANTS NOVEMBER 1973 THROUGH MARCH 1974 (INTERIM PROGRESS REPORT). *Environmental Protection Agency Grant S-802255, Rept. SW-36d.iii, 28p., July 1974.*

Operating experience involving the processing of refuse for use as a supplementary fuel at a coal-fired power plant is reviewed for a joint project undertaken by the City of St. Louis and the Union Electric Company. A total of 9393.31 tons of raw refuse were delivered to the city s refuse processing plant over the period November 1973 to March 1974, and 6641.62 tons of processed refuse were delivered to the electric plant over the same period. The operating and maintenance cost for the refuse processing operation was $5.63/ton, while that for the steam electrical plant was $6.66/ton. Preliminary precipitator and gas emission tests did not disclose any serious air pollution problems. Additional air emissions testing is planned prior to the release of detailed information on emission levels.

54943 **APTIC NO. 77229**

Tanaka, T., M. Koizumi, and Y. Ishihara

WET PROCESS FOR NITROGEN OXIDES REMOVAL FROM FLUE GASES, PART 2, EFFECTS OF REACTION CONDITIONS FOR THE REACTION RATE OF NITROGEN OXIDES REMOVAL WITH SODIUM SULFITE SOLUTION. *(Haien dasho shisshiki kangen ho, dai 2 ho, aryusan natoriumu suiyoeki ni yoru chisso sankabutsu kyushu hanno no hanno joken no kento). Text in Japanese. Chuo Denryoku Kenkyusho Gijutsu Dai-ichi Kenkyusho Hokoku (Tech. Lab. Central Res. Inst. Electr. Power Ind.), no. 74031:1, Sept. 1974.*

The effect of addition of ferrous and ferric compounds to sodium sulfite solution in flue gas denitrification processes as well as other reaction conditions on the denitrification efficiency is considered. A form tower was employed in the experiments, and the ferric and ferrous compounds examined were sulfate and ethylene diaminetetracetic acid compounds. The denitrification efficiency increased with increased sodium sulfite concentration. Nearly 100% efficiency was obtained by the 0.4% sodium sulfite solution when the ferrous chelate compound was added, and 2% sodium sulfite was required to get nearly 100% denitrification efficiency when the ferric chelate compound was used as the additive. For the ferrous sulfate and ferric sulfate additions, increased sodium sulfite concentration up to 10% could not give high denitrification efficiency, and the efficiency obtained with this concentration was 85% and 70% for ferrous sulfate and ferric sulfate additions respectively. The addition of 0.005 M to 0.01 M chelate compounds was sufficient to obtain the high efficiency. The solution PH required to obtain the high efficiency was between 5.0 to 8.0 when 10% sodium sulfite solution was used, however when lower concentrations of sodium sulfite were used, the denitrification efficency was affected by the pH of the solution except for the case of ferrous chelate compound addition. The critical pH values for the ferric chelate compound, ferrous sulfate, and ferric sulfate additions were 6.5, 6.2, and 6.5 respectively, and the denitrification efficiency rapidly decreased at the pH below the critical value in the first two cases, and at the pH higher than the critical value in the last case. The effect of coexisting gases was also studied. The presence of carbon dioxide and sulfur dioxide did not affect the denitrification, however the oxygen concentration decreased the efficiency more than 8%. At the optimum conditions, the denitrification efficiency did not change with the initial nitric oxide concentration if it was less than 1000 ppm.

54944 **APTIC NO. 79018**

Vollheim, G. and J. Troeger

PURIFICATION OF WATER AND AIR BY CATALYTIC REACTIONS. *(Beispiele fuer die Reinhaltung von Wasser und Luft durch katalytische Reaktionen). Text in German. DECHEMA Monograph, 75(1452-1485):183-192, 1974. 7 refs.*

The use of catalytic reactions to control air and water pollution generated by the chemical industry is discussed. The reduction of nitroaromatic substances with the aid of iron and hydrochloric acid is contrasted with reduction by hydrogen on a platinum-active carbon catalyst which produces no harmful by-products. The afterburning of waste gases requires temperatures around 800 C without catalysts for successful waste gas treatment, while catalytic afterburning can be successfully performed at a temperature of about 350 C. A catalyst for the production of halogenated aniline derivatives which serve as intermediates for certain pesticide classes is described.

54945 **APTIC NO. 79183**

Waid, Donald E.

FUEL ECONOMY AND THERMAL INCINERATION. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 14, p. 213-234.*

Thermal incineration is the process of oxidizing combustible material by raising the temperature of the material above its auto-ignition temperature and holding it there for a brief period of time to complete its oxidation. Since thermal incineration is merely an accelerated oxidation process, any material that is still a pollutant after it has been oxidized, or partially oxidized, will not be eliminated as a contaminant by thermal incineration. The development and present status of the process are described. Parameters are listed for successful thermal incineration in several applications. This flexible method can be changed simply as the code requirements change by changing the operating temperature. There is no gradual deterioration of performance with time. Oxygen from the effluent can be utilized for combustion in many cases, reducing fuel consumption requirements. When the heat is reused in the system or some place else in the plant, very little, if any, additional fuel is required for incineration. Quite frequently additional heat from the combustibles in the effluent, not previously recovered, can be utilized some place in the industrial plant. This helps reduce actual operating costs of the incinerator and overall operating costs of the plant. (Author abstract modified)

54946 **APTIC NO. 79178**

Wright, R. J.

SELECTION AND APPLICATION OF PARTICULATE CONTROL DEVICES IN THE STEEL INDUSTRY. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 9, p. 153-159.*

Various points of particulate emissions and possible methods for control in the steel industry are discussed. Dust is produced when raw materials are transferred from the rail car to the hopper, from the stock house to the weigh car, and from the weigh car to the skip car. Fabric filters are used for all three transfers. No simple approach has been found for control of particulates from coke ovens. Scrubbers are often used. Emissions from the blast furnace are principally from the slagging and cast house, which use scrubbers, fabric filters, and, occasionally, precipitators. Generally, the open hearth is vented either by an electrostatic precipitator, a scrubber, or a glass fabric baghouse. The BOF-LD is controlled by either electrostatic precipitators or high energy scrubbers. Tapping directly from the arc furnace or other refined steel processes to a continuous casting machine presents some transfer problems requiring small amounts of fabric, usually glass cloth for filter dust control. Because of the abrasive nature of mill scale, an ample hopper is employed as a primary collector and, depending on the amount of dust involved, a mechanical collector is used as a precleaner and primary collector ahead of fabric or wet scrubbers. Both grinding and polishing are usually shielded in a liquid coolant, eliminating the need for collection equipment. High-efficiency, continuously cleaned, impingement air filters are used for the motor control center and personnel control rooms and cubicles. When heavier ambient air dustloads are experienced the supplemented media precoated fabric filter can be installed.

54947 **APTIC NO. 76981**

Yamamoto, Tamechika and Takuro Ushida

ATMOSPHERIC POLLUTION BY VOLATILE ORGANIC MATERIALS AND THEIR REMOVAL. *(Kihatsu-sei yuki butsu ni yoru taiki osen to sono jokyo). Text in Japanese. Toso to Toryo (Finish Paint), 240(5):51-54, May 1974.*

The relationship between industry and atmospheric pollution, sources of volatile and gaseous organic substances, methods of elimination of these substances, and the recovery of heat is discussed. The main source of volatile organic emissions is the thinners used in painting. The total amount of organic substances used per year in Japan is about 420,000 tons. In the solvents, the amount used is equal to the amount that volatilizes. The most important of these solvents are toluene, xylene, ethyl acetate, butyl acetate, methylethyl ketone, acetone, methylisobutyl ketone, methanol, isopropanol, butenol, trichloroethylene, and perchloroethylene. Gasoline, benzene, cyclohexane, acrylonitrile, vinyl acetate, acrylic ester, and methacrylic esters are also discharged. These are removed by adsorption using activated charcoal. One method of removal is the combustion of these materials in a combustion furnace, especially combustion with a catalyst. Platinum, palladium, activated alumina, and copper oxide may be used for this purpose. High temperatures are necessary for oxidation in the presence of catalysts.

54948 **APTIC NO. 76947**

Yamanaka, Tatsuo

APPLICATION OF PLATINUM CATALYSTS. *(Hakkinzoku shokubai no oyo). Text in Japanese. Shokubai (Catalyst), 16(3):43-50, 1974. 58 refs.*

The application field of platinum group catalysts (Pt and palladium) is increasing in recent years not only in the chemical field but also in air pollution control. The chemical and physical properties and characteristics of the catalysts are described. The application to petroleum and petrochemical fields in catalytic reforming, isomerization of low octane number paraffin to high octane number paraffin, cyclohexane production, purification of C2 and C3-olefins, purification of cracked gasoline, purification of C4-olefins, acetoaldehyde production, vinyl acetate production and city gas production are reviewed. In the synthetic chemical fields, the applications to nitric acid production, hydroxylamine sulfate production, edible oil processing, higher alcohol production, reduction of aromatic nitro compounds, tetrahydrofurfuryl alcohol production, hexamethylenediamine production, disproportionation reactions, hydrogenation of benzene rings, hydrogenation decomposition reactions, hydrogenation of nitriles and other nitrogen compounds, purification of aromatic dicarboxylic acid, liquid phase oxidation and hydrogenation of complex catalyst are reviewed as well as the purification process for gases. The applications to air pollution control include the removal of malodor, catalytic treatment of nitrogen oxides, and cleansing of automotive exhaust, and their application procedures are reviewed.

54949 **APTIC NO. 76974**

Yamazaki, S.

POLLUTION CONTROL MEASURES IN THE SHOWA DENKI SEIKO COMPANY: FOCUSING ON ROOF DUST REMOVAL DEVICES. *(Waga sha no kogaitaisaku: Kenoku shojinsochi o chushin to shite). Text in Japanese. Chuko to Tanko (Cast. Forg. Steel), no. 256:14-19, Nov. 1974.*

The history of dust removal in the Showa Denki Seiko Co., the reason for the need for new dust removal equipment in addition to the old apparatus, and the selection of paper apparatus are discussed. The roof dust removal process is also reviewed. The defects of the old apparatus were due to the direct suction type dust removal apparatus. In February 1974, the old direct suction type apparatus was removed and the roof dust removal type apparatus was installed. The new dust removal apparatus has a capacity of 16,000 cu m gas/min at 80 C.

54950 **APTIC NO. 77118**

DEVELOPMENT OF AN NOX PREVENTION TECHNIQUE FOR SINTERING PROCESS. TESTS BY ELECTRONIC BEAM AND SELECTIVE CATALYTIC REDUCTION METHODS. *(Shoketsu NOx bojo gijutsu no kaihatsu e. Denshisen shoshanho to sentaku sesshoku kangenho de tesuto). Text in Japanese. Ryusan to Kogyo (Sulfuric Acid Ind.), 27(10):23, Oct. 1974.*

A research plan on nitrogen oxides prevention by electron beam irradiation and selective catalytic reduction is discussed. The research plan was sponsored by the Research Committee of the Iron and Steel Industry for NOx prevention. Treatments of sulfur oxides and NOx by electron beam irradiation have been confirmed by Ebara Manufacturing Co. and by the Japan Atomic Energy Research Institute. Both substances form aerosols when irradiated and are collected by an electrostatic precipitator. Under the plan, a 3000 N cu m/hr pilot plant is to be built at the Yahata steel plant in order to study optimum operating conditions. The selective catalytic reduction method used carbon monoxide gas, or ammonia as reducing agents. Under the plan, a 5000 N cu m/hr pilot plant is to be built at the Chiba plant of Kawasaki Manufacturing Co. to study catalyst life, optimum operating conditions, and material and heat balance.

1973

54951 **APTIC NO. 79136**

Bernstein, L. S., R. J. Lang, R. S. Lunt, G. S. Musser, and R. J. Fedor

NICKEL-COPPER ALLOY NOX REDUCTION CATALYSTS FOR DUAL CATALYST SYSTEMS. *Preprint, Society of Automotive Engineers, Inc., New York, 13p., 1973. 8 refs. (Presented at the Society of Automotive Engineers, Automobile Engineering Meeting, Detroit, Mich., May 14-18, 1973, Paper 730567.)*

Results from performance and durability tests of a nickel-copper alloy nitrogen oxides reduction catalyst designed to be incorporated in a dual catalyst system are reported. The catalyst is a significant improvement over the published state of the art for NOx reduction catalysts. The average NOx emissions after 20,000 mi of durability testing with the catalyst on the Federal Test Cycle are 0.37 g/mi; after 30,000 mi, the emission figure deteriorates to 0.83 g/mi. Rapid warm-up of the catalyst system is achieved by keeping the NOx reduction catalyst mass low and making use of the reduction catalyst s ability to oxidize carbon monoxide, hydrogen, and hydrocarbons under net reducing conditions. This ability is also used to maintain the system operating temperature.

54952 **APTIC NO. 79137**

Hinton, M. G., Jr., T. Lura, J. Meltzer, and J. H. Somers

GASOLINE LEAD ADDITIVE AND COST EFFECTS OF POTENTIAL 1975-1976 EMISSION CONTROL SYSTEMS. *Preprint, Society of Automotive Engineers, Inc., New York 21p., 1973. 62 refs. (Presented at the Society of Automotive Engineers, International Automotive Engineering Congress, Detroit, Mich., Jan. 8-12, 1973, Paper 730014.)*

The effects of leaded gasoline on catalytic converters for automotive emission control are reviewed along with the costs of potential 1975-1976 automotive emission control systems. The use of leaded or low-lead gasoline greatly reduces the activity of catalysts, preventing the achievement of a 50,000-mile lifetime at emission levels capable of meeting the Federal standards. Thus, unleaded gasoline is required in quantities sufficient to satisfy the demands of vehicles equipped with catalytic converters. The estimated overall costs to the consumer for emission control systems being considered for the 1976 model year are $860 above average 1970 vehicle costs over an 85,000-mile vehicle lifetime. This estimate is based on a system incorporating a dual hydrocarbon/carbon monoxide and nitrogen oxide catalyst, a low-grade rich thermal reactor, and exhaust gas recirculation. This system appears to offer the most promise for meeting the 1976 NOx emission standard of 0.4 g/mi. (Author abstract modified)

54953 **APTIC NO. 79040**

Lorenzi, L., Jr., L. J. Van Nice, and R. A. Meyers

PRELIMINARY COMMERCIAL SCALE PROCESS ENGINEERING AND POLLUTION CONTROL ASSESSMENT OF THE MEYERS PROCESS FOR REMOVAL OF PYRITIC SULFUR FROM COAL. *Ironmaking Proc., AIME, vol. 32:110-123, 1973. 9 refs.*

The Meyers process for the removal of pyritic sulfur from coal is described. The process employs a regenerable aqueous ferric sulfate solution to chemically leach iron pyrite from the coal matrix. Pyritic sulfur is removed in the form of elemental sulfur and iron sulfate. The heating value of the coal increases, and the ash content decreases as a result of pyrite removal. The treatment of a typical high pyrite Lower Kittanning coal which contains 3.2% pyritic sulfur results in a product with the following characteristics: organic sulfur - no change, pyritic sulfur - 0.17%, elemental sulfur - 0.04%, and added sulfate sulfur - 0.03%. This type of product coal meets the standards of performance for coal combustion in new stationary sources provided the sum of the organic and sulfate sulfur content of the feed coal does not exceed approximately 0.6 wt%. Preliminary overall processing (including capital) costs for a 100 ton/hr commercial plant are projected to be 7-15 cents/million Btu, depending on the sulfur content of the raw coal, the amount of sulfur removal required, and the characteristics of the coal.

54954 **APTIC NO. 79113**

Environmental Protection Agency, Research Triangle Park, N. C., Office of Air and Water Programs

CONTROL TECHNIQUES FOR BERYLLIUM AIR POLLUTANTS. *Publication AP-116, 73p., Feb. 1973. 33 refs.*

NTIS: PB 221044

Industrial sources of beryllium pollution and methods for controlling such emissions are discussed. Approximately 300 facilities in the United States either extract beryllium or manufacture beryllium-containing products. Beryllium extration processes generate atmospheric emissions that include beryllium salts, acids, beryllium oxide, and other beryllium compounds in the form of dust, fume, or mist. Facilities engaged in processing beryllium-containing materials generate a much more restricted range of emissions, including beryllium dust from machine shops, beryllium oxide dust from ceramic production, and beryllium-containing dust and fume from beryllium-copper foundry operations. Beryllium emissions can be controlled by the following classes of gas-cleaning equipment: prefilters, dry mechanical collectors, wet collectors, fabric filters, and high- efficiency particulate air filters. The choice of specific control equipment is governed by process variables, effluent properties, and economics. Emission control costs in most cases do not exceed 10-15% of the cost of manufacturing equipment. Beryllium-contaminated waste can also be disposed of by controlled incineration or detonation employing appropriate emission control devices. Specific design parameters and configurations for various control devices are presented in an appendix. (Author abstract modified)

54955 **APTIC NO. 79191**

Scott Research Labs., Inc., San Bernardino, Calif.

EMISSION EVALUATION OF A KENDIG VARIABLE VENTURI CARBURETOR. *In: Implementation of Transportation Controls. 93rd Congress (Senate), First Session, Serial 93-H29, p. 566-569, Nov. 16, 1973. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

The emissions characteristics of the Kendig variable venturi carburetor installed on a 1973 Toyota equipped with a 1968 cc engine and automatic transmission were evaluated. The 1975 Federal cold start emission test was employed, and the test fuel was Indolene HO. Mass emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and carbon dioxide were: 1.44, 14.93, 2.75, and 523.4 g/mi, respectively.

54956 **APTIC NO. 79193**

California Air Resources Board, El Monte

REPORT ON EMISSIONS FROM VEHICLES EQUIPPED WITH UOP S CATALYTIC DEVICE. *In: Implementation of Transportation Controls. 93rd Congress (Senate), First Session, Serial 93-H29, p. 317-328, Nov. 16, 1973. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

Emissions tests were performed on 100 automobiles (1966-1972 model years) equipped with a Universal Oil Products catalytic converter. Most of the installations also included an air pump to achieve sufficient excess air for the catalytic conversion. The combination of converter and air pump resulted in average hydrocarbon and carbon monoxide reductions of 58 and 57%, respectively, after an average mileage of 10,179 mi. Aldehyde emissions were also lowered by about fourfold.

54957 **APTIC NO. 79194**

Clean Air Research Co., Pico Rivera, Calif.

AN EVALUATION OF THE EFFECTIVENESS OF AUTOMOBILE ENGINE ADJUSTMENTS TO REDUCE EXHAUST EMISSIONS AND AN EVALUATION OF THE TRAINING REQUIRED TO DEVELOP PERSONNEL COMPETENT TO MAKE THE ADJUSTMENTS. *In: Implementation of Transportation Controls. 93rd Congress (Senate), First Session, Serial 93-H29, p. 260-289, Nov. 16, 1973. 2 refs. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

The effectiveness of automobile engine adjustments in reducing exhaust emissions was evaluated for 300 vehicles representative of the 1957-1970 California vehicle population. The adjustments were made by 10 Class A mechanics who received 40 hr of training in the procedure. The adjustments resulted in hydrocarbon and carbon monoxide emission reductions of 36.7 and 35.2%, respectively. Nitrogen oxide emissions were increased by 5.6%. The average cost of the tune-up procedure was $27.40. After an average mileage of 5283 miles and 6 mo of service, emission control degradation was small, with hydrocarbon and CO reductions still being 29.5 and 30%, respectively. (Author abstract modified)

1972

54958 **APTIC NO. 79027**

Bergqvist, Kjell

EXPERIMENTS WITH A CATALYTIC CLEANER FOR CAR ENGINE EXHAUST GASES. THE EFFECT OF PULSATING EXHAUST GAS FLOW ON CARBON MONOXIDE CONVERSION IN A CATALYST BED. *(Forsok med katalytisk bilavgasrenare. Inverkan av pulserande avgasstrom pa omsattningen av kolmonoxid i en katalysatorbadd). Text in Swedish. Research Inst. of National Defense, Division 1, Sundbyberg, Sweden, Rept. FOA 1, 18p., Dec. 1972. 5 refs.*

NTIS: N75-12455

The effect of forced pulsation at 35 c/s and of oxygen concentration on the conversion of carbon monoxide in a fixed catalyst bed with radial throughflow was studied on a Volvo B-18 engine. The catalyst bed was composed of cylindrical alumina grains containing 0.1% platinum. Pulsation of the exhaust gas caused no marked change in the conversion of carbon monoxide as compared with that of normally streaming exhaust gas. Variations in the quantity of secondary air admitted to the exhaust gas before the catalyst bed caused immediate changes in the CO conversion.

54959 **APTIC NO. 76962**

Ishikawa, H.

ON POLLUTION SOURCES AND AIR POLLUTION PREVENTION TECHNOLOGY. *(Hasseigen to boshi gijutsu ni tsuite). Text in Japanese. Enjiniyasu (Engineers), no. 292:18-21, Dec. 1972.*

Air pollution prevention in Japan is reviewed. Topics covered include: the present situation and problems of desulfurization of stack smoke in Japan, the desulfurization of stack smoke by activated charcoal methods desulfurization by the Wellman-Lord method, basic research on dust collecting equipment, technology to prevent the emission of nitrogen oxides from stationary sources, improvements in the performance of dust collectors for emissions from boilers using coal and and combustion and smoke prevention systems. Due to stringent measures taken against sulfur oxides, since 1968, levels are significantly lower. Japan excels in desulfurization technology. Tokyo sets fuel standards on the basis of sulfur content of heavy oil, depending upon heavy oil consumption; however, this should be regulated according to the sulfur content in the stack emission.

54960 **APTIC NO. 76961**

Kobayakawa, T.

SUMMING UP AUTOMOBILE EXHAUST GAS. *(Jidosha haiki gasu o matomete). Text in Japanese. Enjiniyasu (Engineers), no. 292:22-25, Dec. 1972.*

Topics on automobile exhaust emissions control are reviewed. The topics include: the present situation of air pollution in Japan and its relationship to exhaust, a program to reduce exhaust in the future, exhaust countermeasure technology in Japan, purification of exhaust by catalytic methods, and recent information on the technology to cope with exhaust. Regarding nitrogen oxide levels, Japan and the United States have similar figures, but the latter has lower carbon monoxide emissions from automobiles, being 63.8%, while Japan s figures is much higher at 93%. In Japan, automobiles do not contribute to hydrocarbons as much as in the United States. In Japan, cars must be checked for exhaust emissions every 6 mo. Some examples of catalytic conversion are explained. A Japanese reduction catalyst is described. Developments including rotary engines, stratified charge engine and two-cycle engines, in Japan are described also.

1970

54961 **APTIC NO. 79538**

Holub, J. and J. Koliha

A NEW PROCESS FOR THE PRODUCTION OF SMOKELESS FUELS BY PELLETIZATION. *(Novy Zpusob vyroby bezdymych paliv peletizaci). Text in Czech. Sbornik Praci UVP Ustav Vyzkum Vyuziti Paliv Prague), vol. 27:1-75, 1970 (?). 13 refs.*

Laboratory tests and pilot-plant equipment for pelletization of different types of coal is described. Optimum operational parameters are evaluated. The process involves production of pellets from fine, weakly caking coal, followed by carbonization with the help of a solid heat carrier. Optimum operation requires coal whose granularity is less than 1 mm, of which 70% must be below 0.6 mm in diameter. Optimum diameter of pellets is 25-30 mm. Optimum carbonization conditions are a temperature of 700 C, applied for 8 min, with pellets preheated to 110-120 C. The equipment can operate on a continuous basis but additional development is needed to increase its capacity.

1969

54962 **APTIC NO. 77080**

Audibert, F. and J. P. Catry

HYDRODESULFURIZATION OF RESIDUES AND CONSEQUENCES FOR THE REFINING INDUSTRY. *(L hydrodesulfuration des residus et ses consequences pour l industrie de raffinage). Text in French. Assoc. Fr. Tech. Pet. Rev., p 67-78, 1969. 5 refs.*

Several methods for the desulfurization of residues and fumes are discussed in light of the consequences in the refining industry in various countries, including the Arab countries, Japan, and the United States. Desulfurization methods include the decreasing of sulfur content in fuels and fumes, avoiding high concentrations in emission sources, and promoting dispersion with high chimneys. The first method is the most feasible. The treatment of residues depends on the amount of recycled product, asphaltites content, and the presence of metals. Demetallization follows the process of desulfurization. The initial temperature should be 50 C for a 3% efficiency. The pressure depends upon the purity of the hydrogen in the gas, the total pressure in the unit and the composition and debit of the recycled gas. The temperature varies between 360 and 440 C. The spatial velocity ranges from 0.3 to 1, depending upon the nature of the fuel and the degree of desulfurization required. Investment expenses and profits are discussed. The naphtha needed for hydrogen production is valued at 23.9 dollars/ton, while sulfur is estimated at 32.6 dollars/ton. The cost for naphtha represents 25 to 30% of the total cost.

1965

54963 **APTIC NO. 75912**

Domanski, Ireneusz and Witold Kozlowski

CONSTRUCTION AND UTILIZATION OF WET ELECTRICAL PRECIPITATORS. *(Konstrukcja i eksploatacja mokrych elektrofiltrow). Gospod. Paliwami i Energi., vol. 13:23-27, 1965. 6 refs. Translated from Polish, 13p.*

Design and operating criteria for wet electrostatic precipitators of the wire-in-plate and wire-in-tube types are reviewed, with particular emphasis on the collection of dust from blast furnace gases. The wire-in-plate precipitator is generally more efficient in removing dust from such gases than is the wire-in-tube type, though the latter is simpler in construction and is easier to operate. Outlet dust concentrations ranging from 1.5-2.1 g/normal cu m are typical for the above two devices.

1960

54964 **APTIC NO. 79225**

Muhlrad, W.

SMOKE EMISSIONS BY ELECTRIC METALLURGICAL FURNACES. *(Probleme des fumees emises par les fours electrometallurgiques). Text in French. Chaleur Ind., no. 422:237-255, Sept. 1960.*

Problems of flue gas and dust emissions from electric metallurgical furnaces and methods for their abatement are described. Ferrosilicon furnaces emit particulate matter composed of silica (85-91%), ferric oxide, alumina, magnesia, and alkalies. Some 62% of the particles are smaller than 0.5 micron, and 93% smaller than 10 micron. Venturi batteries, high-speed venturis, dry or wet electrostatic precipitators, and tissue filters are suitable for dust separation after ferrosilicon furnaces, at efficiencies exceeding 90%. Bag filters, especially those made of tergal, ensure efficiencies over 98%. Dry-type dust separation should be applied whenever the dust is to be recovered. Bag filters are well-suited for dust separation after ferromanganese, ferrosilicon-manganese, ferrochrome, ferrosilicochrome, and ferrotungsten furnaces. Dust emitted from ferronickel furnaces is best separated by centrifugal separators, which can also be used at efficiencies over 90% for calcium carbide dust. The dust emitted by calcium carbide furnaces cannot be separated by electrostatic precipitators or bag filters due to the high flue gas temperature.

MEASUREMENT METHODS

1975

54965 **APTIC NO. 75903**

Avetta, Edward D.

IN-STACK TRANSMISSOMETER EVALUATION AND APPLICATION TO PARTICULATE OPACITY MEASUREMENT (FINAL REPORT). *Owens-Illinois, Inc., Pittsburgh, Pa., Fecker Systems, Environmental Protection Agency Contract 68-02-0660, Program Element 1AA010, ROAP 26AAM, Rept. EPA-650/2-75-008, 124p., Jan. 1975.*

NTIS: PB 243402/AS

Laboratory and field tests to investigate the performance of a commercially available transmissometer as an in-situ particulate opacity monitor of industrial stack emissions were conducted. The transmissometer was mounted for a period of at least 30 days at each of three different sites. At each site concurrent plume opacity measurements were made by telephotometry of contrasting targets through the plumes for comparison to the in-stack readings of the transmissometer. Additional plume measurements were made at one of the sites by direct telephotometry of a lamp behind the plume. A one-to-one correlation between in-stack and pplume opacity was observed at one site. Data obtained at the other two sites were limited to much narrower ranges of emission levels, although there was a one-to-one correlation within the narrower range at one of the other sites. The transmissometer oerformed well at all three sites. (Author abstract modified)

54966 **APTIC NO. 79366**

Axelrod, Herman D., Richard A. Pickett, II, and Nancy A. Engel

MEASUREMENT OF SUB-PPB BY VOLUME LEVELS OF ATMOSPHERIC NITROGEN DIOXIDE USING AN ALKALINE TRAPPING SOLUTION AND SPECTROFLUOROMETRIC ANALYSIS. *Anal. Chem., 47(12):2021-2023, Oct. 1975. 13 refs.*

The measurement of sub-ppb by volume levels of atmospheric nitrogen dioxide is described using an alkaline trapping solution and spectrofluorometric analysis. The coupling of a fluorometric technique with a sodium hydroxide trapping system enable background measurements to be made. The overall sensitivity of the techniques is 0.01 ppbv for a 100 l air sample at 600 torr, 25 C. This sensitivity level is more than adequate to measure background concentrations of NO2. Interferences are caused by oxidants, sulfur dioxide, or sulfur trioxide -2. The problems were overcome by adding SO3-2 to both the samples and standards at a 50-fold concentration excess over the dye concentration.

54967 **APTIC NO. 77131**

Ball, Joseph J. and Richard A. Keller

QUANTITATIVE DETERMINATION OF GASEOUS NITROGEN DIOXIDE CONCENTRATIONS OVER LONG PATH LENGTHS BY SELECTIVE ABSORPTION OF ARGON ION LASER EMISSION. *J. Air Pollution Control Assoc., 25(6):631-633, June 1975. 3 refs.*

The absorption coefficients of nitrogen dioxide (NO2) at several laser lines emitted by an argon ion laser in the visible region of the optical spectrum were measured in a multiple pass absorption cell. A differential technique, in which the ratio of the transmitted intensities of the argon laser emissions is measured, is described to determine the concentration of NO2 in a polluted atmosphere over path lengths of several kilometers. Measurement of ratios eliminates interferences from particle scattering and thermal index gradients. Evaluation of the data taken in the 48 multipass cell indicates that concentrations of NO2 less than one part per million could be determined in a 1 km optical path. (Author abstract)

54968 **APTIC NO. 79213**

Bilger, R. W.

PROBE MEASUREMENTS IN TURBULENT COMBUSTION. *Purdue Univ., West Lafayette, Ind., School of Mechanical Engineering, Rept. PURDU-CL-75-02, 17p., May 1975. 28 refs.*

Measurements of composition, temperature, velocity, and turbulence using hardware probes are reviewed. In streaming flows, probe measurements of velocity and main species mass fractions to within 10% of their Favre average are achievable; and measurements of temperature to within about 5% of its time mean. The strong fluctuations in density present in turbulent combustion can lead to sampling errors. Velocities and species concentrations will actually be measured as the Favre averaged values. (Author abstract modified)

54969 **APTIC NO. 77087**

Birks, L. S. and M. Fatemi

QUANTITATIVE MEASUREMENTS OF POLLUTANT ASBESTOS: I. A NEW X-RAY DIFFRACTION TECHNIQUE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 10p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-50.5.)*

An X-ray diffraction technique for the measurement of submicrogram quantities of asbestos is described. The technique employs a spectrographic X-ray tube to generate a broad beam of X-rays which are diffracted from a 1 cm diameter specimen mounted perpendicular to the beam. A pair of electronic detectors are used simultaneously to measure the asbestos signal and background. Electrostatic alignment of the fibers is required for distinguishing chrysotile or other fibrous forms from serpentine and other clay minerals. The limit of detection for 10-minute measurements is about 0.2 micrograms in the absence of large quantities of extraneous material or about 0.4 micrograms for ambient air samples. The X-ray method is more quantitative for total mass as well as much faster than electron microscopy. (Author abstract modified)

54970 **APTIC NO. 77230**

Chiba, Atsushi

MICRODETERMINATION OF CADMIUM, CALCIUM, AND COPPER IN ATMOSPHERIC PARTICULATES BY A GLASS RING OVEN TECHNIQUE. *(Ringu obun ho ni yoru taiki chu fuyu ryushijo bushitsu chu no kadomiumu, karushumu oyobi do no teiryo). Text in Japanese. Nippon Kagaku Kaishi (J. Chem. Soc. Japan), no. 7:1193, 1975.*

The ring oven technique for the determination of cadmium, calcium, and copper in airborne particulates is described. The ariborne particulates collected on a membrane filter were dissolved onto a filter paper using 0.2 N nitric acid-0.2 N hydrochloric acid 1:1 mixture and treated with hydrogen sulfide. The sample bearing filter was cut into four pieces for the ring oven treatment. The filter piece was placed on the semicircular glass ring oven, and the calcium was developed with 4.5 microliters of 0.05 N HCl, while the cadmium and copper was developed with 4 microliters and, subsequently 5 microliters of 0.028% ammonia water. The color producing reagents used were bathocuproin for C and 2.0 wt% sodium hydroxide-0.2 wt% glyoxal-bis(2-hydroxylanil) ethanol solution for Cd and Ca. The produced color was determined by a microscope and compared with that of the standard for the determination. The developed Ca zone contained zinc, aluminum, iron, nickel, and magnesium, however the coexisting metals in the excess amount regarding the Ca concentration did not affect the 0.5 microgram Ca determination if the metal concentrations were less than 200 times for Mg, 300 times for Zn and Ni, 500 times for Fe, or 800 times for Al. The presence of copper affected the cadmium determination when the Cu was present at more than 10 times the Cd concentration. However, the interference could be eliminated by masking the Cu with 0.1 wt% sodium thiosulfate solution or by using the standard addition method. The detection limit by the method was 0.005 micrograms for Cd and Ca, and the required time for the analysis was about 40 min. The analytical results of airborne particulate by the technique were compared with those obtained by atomic absorption spectrometry and flame photometry, and the analyzed values by these methods agreed. The Cd and Ca concentrations found in the atmosphere ranged from 0.009 to 0.016 micrograms/cu m and 2.60 to 4.01 micrograms/cu m respectively with a standard deviation of 5%.

54971 **APTIC NO. 77260**

Chisaka, Fumitake, Shigeru Yanagihara, and Isamu Shimada

MEASUREMENT OF ATMOSPHERIC NOX WITH CONVERTED CHEMILUMINESCENCE NO DETECTOR (I). *(Taiki chu no chisso sankabutsu nodo no sokutei ni tsuite). Text in Japanese. Kikai Gijutsu Kenkyusho Shoho. (J. Mech. Eng. Lab.), 29(2):41-53, March 1975. 6 refs.*

The corresponding nitric oxide (NO) concentration of nitrogen oxides (NOx) in urban atmosphere is measured. The corresponding NO concentration is that which would exist if nitrogen dioxide (NO2) and other products formed from NO in urban atmosphere could be converted into NO by means of suitable catalytic converters under controlled temperature. Optical detectors based on chemiluminescence are very sensitive for measuring low atmospheric concentrations of NO and have wide linearity. Stainless steel and gold wool convertors were investigated as a step in the development of a method of measuring corresponding NO concentration. For a stainless steel converter at 640 C, the efficiency of ethyl nitrate (C2H5ONO2) to NO conversion is 86.0%. The rate of conversion of ammonia (NH3) to NO is affected by humidity; the conversion efficiency is in the vicinity of 50% when the sample is diluted with dry air. The conversion efficiency of NH3 into NO decreases by about 50% when NO is added as compared with a sample not containing NO. The efficiency of ethyl nitrite (C2H5ONO) conversion is 6.5% for a gold wool converter at 116 C. The conversion of NH3 is negligible while nitric acid is substantially converted into NO. The efficiency of C2H5ONO to NO conversion was nearly the same for stainless steel and gold wool converters although the temperatures were not identical. The conversion efficiency is assumed to be nearly 100%. The reduction efficiency of the products formed from NO+ozone systems is low as compared with the initial NO concentration. (Author abstract modified)

54972 **APTIC NO. 79150**

Courtecuisse, S. and M. Benarie

VARIANCE OF AIR SAMPLES TAKEN FOR AIR ANALYSIS AS EXEMPLIFIED BY ATMOSPHERIC AEROSOL. *(La variance de l echantillon dans le cas des analyses de l air illustree sur l exemple de l aerosol atmospherique). Text in French. Sci. Total Environ., vol. 3:249-258, 1975. 4 refs.*

The variance in airborne particulate matter analyses for 11 different metals was investigated. Samples of 200 cu m of urban air were collected over 24 hr on cellulose filters. The filters were cut into four quarters, and each quarter was separately analyzed by atomic absorption spectrometry for calcium, sodium, potassium, magnesium, copper, zinc, iron, lead, manganese, nickel, and chromium. The residual standard deviation among the quarters of the filter was 10%. The results question the reliability of using ambient air as a common standard for the intercomparison of air sampling instruments.

54973 **APTIC NO. 77208**

Demuynck, M.

DETERMINATION OF IRREVERSIBLE ABSORPTION OF WATER BY CELLULOSE FILTERS. *Atmos. Environ., 9(5):523-528, May 1975. 7 refs.*

The effect of irreversible absorption of water by cellulose filters used in high volume sampling procedures for the determination of total suspended particulates was investigated for a variety of atmospheric conditions. The amount of water irreversibly absorbed strongly depended on the atmospheric humidity for short sampling periods; during a 1-hour sampling period on a foggy day, it appeared to be of the same order as an average particulate load obtained by commercial high volume samplers in urban areas. A mean correction factor which was determined during various atmospheric conditions for 24-hour sampling periods amounted to 4.2 + or - 2.4 mg on the average for a Whatman 41 filter of 11 cm in diameter (0.8 g of cellulose) at a mean atmospheric humidity of 90%. (Author abstract modified)

54974 **APTIC NO. 79037**

Dzubay, T. G., L. E. Hines, and R. K. Stevens

PARTICLE BOUNCE ERRORS IN CASCADE IMPACTORS. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., 24p., 1975. 10 refs.*

Field measurements of atmospheric aerosols using cascade impactors indicated that the nature of the impaction surface exerts a significant effect on the apparent size distribution. The tests were performed with two identical cascade impactors operating simultaneously. Dry impaction surfaces (aluminum foil, glass fiber filter material, and wax-coated paper) were used in the first impactor, while grease-coated foils were used in the second as a reference. A comparison of the measured size distributions indicated that the use of dry impaction surfaces leads to a distorted measurement of the size distribution. The distortion is attributed to particles bouncing off of the dry impaction surfaces and being collected on subsequent stages or on the backup filter. (Author abstract modified)

54975 **APTIC NO. 79491**

Gardner, G. C.

DEPOSITION OF PARTICLES FROM A GAS FLOWING PARALLEL TO A SURFACE. *Int. J. Multiphase Flow, 2(2):213-218, Sept. 15, 1975. 15 refs.*

Means for calculating the deposition rate of particles from a turbulent gas stream flowing parallel to a surface are presented. The first part of the method of calculation concerns the diffusion and eddy diffusion-impaction regimes. These regimes involve the smallest and intermediate size particles, respectively. The second part concerns the turbulent impaction regime which involves the larger particles. (Author abstract modified)

54976 **APTIC NO. 79516**

Heintzenberg, Jost

DETERMINATION IN SITU OF THE SIZE DISTRIBUTION OF THE ATMOSPHERIC AEROSOL. *J. Aerosol Sci., 6(5):291-303, 1975. 42 refs.*

The in situ number-size distribution of the atmospheric aerosol in the size range between 0.05 and 2 micron radius was investigated. The experimental system consisted of a four channel integrating nephelometer, a two channel optical particle counter, and a condensation nucleus counter. An inversion method was tested by model computations and by measurements with artificial aerosols. The in situ size distribution was then computed from the data of the experimental system using this method. The results for the urban area of Mainz are shown graphically. (Author abstract modified)

54977 **APTIC NO. 76992**

Hilborn, J. C. and J. L. Monkman

GAS CHROMATOGRAPHIC ANALYSIS OF CALIBRATION GAS MIXTURES. *Sci. Total Environ., 4(1):97-106, May 1975. 4 refs.*

The use of gas chromatography for the analysis of calibration gas mixtures is discussed. A Perkin-Elmer 900 gas chromatograph equipped with flame ionization, flame photometric, and thermal conductivity detectors is used for the verification analysis. The following gas chromatographic conditions are used for the analysis of oxygen, nitrogen, carbon monoxide, methane, and carbon dioxide in a mixture at levels greater than 0.1% of the component in the mixture: thermal conductivity detector temperature, 200 C; TCD current, 150 milliamperes; program, 35 C for 4 min followed by 24 C/min to 100 C and hold until carbon dioxide is eluted; carrier flow, 50 ml/min; injector temperature, 150 C; and manifold temperature, 200 C. A flame photometric detector is used in conjunction with a Carbopak B-HT-100 column for the detection of sulfur dioxide and hydrogen sulfide at levels less than 10 ppm for each component. A flame ionization detector is used for the analysis of trace quantities of CO and CH4 in air or N2. If the concentration of a component exceeds 1%, direct measurement of an aliquot of pure gas can be used for calibration purposes. This avoids a dilution step in the calibration process with a resultant increase in overall accuracy.

54978 **APTIC NO. 77138**

Hoshika, Yasuyuki, Ichiro Kojima, Kazumi Koike, and Kenji Yoshimoto

RELATIONSHIP BETWEEN RETENTION TIME OF DIRECT INJECTION METHOD AND RETENTION TIME OF PRECOLUMN INJECTION METHOD OF THE SULFUR COMPOUNDS IN GAS CHROMATOGRAPHY. *(Io kagobutsu no gasu kuromatogurafi ni okeru shiryo chokusetsu donyu ho to purekaramu donyu ho no hojo jikan no kankei). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 24(7):400, July 1975.*

The retention times of 33 typical sulfur compounds are measured using three different gas chromatography columns; tris (2-cyanoethoxy) propane (TGEP), tricresylphosphate (TCP), and polyphenylether (PPE). The measurement of retention times was made by both the direct injection method and precolumn injection method, and the relative retention time was obtained for each sulfur compound as the ratio of the retention times by the former method and latter method. The former method was the direct injection of sulfur compounds into the GC column, and the latter method was the injection into the precolumn cooled by liquid oxygen. The ratio of relative retention time for sulfur compounds ranged from 0.7 to 1.7 for the TCEP column, 0.7, to 20 for the TCP column, and 0.5 to 2.2 for the PPE column. The value of the ratio was larger for sulfur compounds of low boiling point thhan those of high boiling point. The effect of column temperature on the observed ratio was also examined. The effect of column temperature was relatively small except for the cases of carbonyl sulfide in TCEP column, hydrogen sulfide in TCP column, and 13 compounds including H2S in PPE column. By knowing the retention time of sulfur compounds by the direct injection method, the estimation of the retention time by the precolumn injection method was therefore possible.

54979 **APTIC NO. 77028**

Hozumi, Keiichiro

ACTUAL SITUATION OF POLLUTION ANALYSIS AND ACCURACY IN MEASURING MICRO-AMOUNTS OF MASS. *(Kogai bunseki to bisho shitsuryo sokutei seido no jittai). Text in Japanese. Keiryo Kanri Keisoku Keiso J. Instrum. Control Assoc. Japan), 24(6):295-298, June 1975. 6 refs.*

Precision in microanalytical measurements in analytical laboratories was checked by sending out to each of six representative laboratories in Japan a set of known weights (2 mg, triangular shape; 5 mg, hexagonal shape; 10 mg, square shape) made of German silver, and requesting the recipients to determine the weights according to set procedures, in between their regular analytical work. These sets of weights were returned to Keiryo Kenkyusho (Measurements Research Institute), and their weights were redetermined. Work was conducted from April-June 1974, during the wet season, so the effect of humidity on measurements was not checked. Other data requested from the analytical laboratories included type and brand-name of balance, standards used on the balance, environmental conditions during measurement (type of building, vibration elimination, controlled atmosphere), and procedural data. Environmental conditions for the balance rooms were good in all six laboratories. Average values of the weights (for 2-milligram and 5-milligram weights), determined by the six laboratories, differed from the weights initially recorded before distribution by -10 to +5 micrograms. For the 10-milligram weight, variations from -20 to +30 micrograms were obtained. When the sets of weights were reweighed after return, all of the weights had become heavier after the 2-month sojourn. For the 10-milligram weights, an increase in weight of 3 micrograms was found. Oxidation and the presence of contaminants on the German silver weights are indicated, but have not been investigated yet.

54980 **APTIC NO. 78991**

Huillet, F. Dale

THE MONITORING OF SO2, NO, CO AND OPACITY WITH AN IN-STACK DISPERSIVE SPECTROMETER. *Preprint, Scott Paper Co., Everett, Wash., 4p., 1975. (Presented at the TAPPI Environmental Conference, Denver, Colo., May 14-16, 1975.)*

An in-stack dispersive spectrometer for the continuous and simultaneous monitoring of sulfur dioxide, nitric oxide, carbon monoxide, and opacity is described along with operating experience gained at an ammonia-base sulfite liquor incineration system at a paper company. The monitor utilizes a single beam with a dual wavelength ratioing system to produce most of the advantages of a double beam instrument. A polychromatic beam of ultraviolet radiation is used for SO2 and NO measurements, while infrared is used for the CO measurement. The opacity channel is a double pass system using a corner cube retro- reflecting mirror and photopic light with a wavelength between 400 and 700 micron. After an initial shake-down period, maintenance on the unit was minimal and accuracy and reliability were good. Agreement with other test methods was generally within 10%.

54981 **APTIC NO. 79323**

Husar, Janja D., Rudolf B. Husar, and Pamela K. Stubits

DETERMINATION OF SUBMICROGRAM AMOUNTS OF ATMOSPHERIC PARTICULATE SULFUR. *Anal. Chem., 47(12):2062-2065, Oct. 1975. 10 refs.*

The vaporization-flame photometric detector (FPD) was improved and adapted for the precise determination of submicrogram quantities of particulate sulfur. The sulfur compounds that are the dominant components of the submicrometer range urban aerosol are sulfuric acid, ammonium sulfate, and bisulfate, and zinc ammonium sulfate. Calibration curves are obtained using standard solutions of these sulfates in the range of 0.16-34 micrograms/ml of sulfur. Within the experimental error, the S recovery for the five sulfates is 100%. The technique is uniquely suitable for analysis of filter samples collected in plumes by aircraft. (Author conclusions modified)

54982 **APTIC NO. 77174**

Hyzer, William G.

PARTICLE MEASUREMENT. *Res. Dev., 26(4):50, 52, 54, and 56, April 1975. 15 refs.*

Photonic methods for detecting and measuring fluidborne particles are reviewed. There are three broad categories of such methods that are currently in use: particles are collected on a solid or liquid substrate for microscopic examination; fluid samples are drawn down through an orifice into a test volume where the particles are sensed serially by photic means; and fluidborne particles are dynamically recorded in situ by means of film or video tape with laser shadowgraphy or holography. Instantaneous particle counters that are based on photic sensing by a light- scattering principle can monitor particles ranging downwards in size to 0.3 micron for airborne particles. One of the more current developments in particle measurement involves the spraying of aerosol particles through a laser beam of a pulsed system for particle counting and recording. Real-time images are displayed on a television monitor. At 60 frames per second, the in-focus particle count rate is typically on the order of 600/sec. The particle size range of the technique is from 0.3 micron to 1 cm in diameter for particle velocities up to 3500 m/sec.

54983 **APTIC NO. 77121**

Igarashi, Shigeru

DETERMINATION OF CADMIUM WITH DUST JAR. *(Kanibijinkei de hoshu shita kokabaijin chu no cadomiumu no teiryo). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo), 24(4):270, April 1975.*

An analytical technique for cadmium determination in sedimented dusts collected by a dust jar by atomic absorption spectrometry with the solvent extraction technique was developed. The sample dust was dissolved into water and the insoluble components were filtered out from the solution. Both soluble and insoluble components were ashed separately at 450 C in an electric furnace. Each sample was dissolved into 30% nitric acid after the ashing treatment, and 5% hydrogen peroxide was added to the solution. The Cd was then extracted into methyl isobutyl ketone using 3% sodium diethyldithiocarbamate from this solution at pH 9.5. The addition of more than 2 ml of 10% potassium cyanide to the 20 ml sample solution containing 0.64 to 3.17 mg copper, 1 microgram Cd and 1.0 mg iron prior to the addition of sodium diethyldithiocarbamate solution allowed the preferential Cd extraction into the MIBK, leaving the copper and iron metals unextracted.

54984 **APTIC NO. 79378**

Imakami, K.

DETERMINATION METHOD AND PROBLEMS OF DUST CONCENTRATION IN THE FLUE GAS. *(Endo haigasu chu no baijin nodo no sokutei hoho to sono mondai ten). Text in Japanese. Anzen Kogaku (J. Japan Soc. Safety Eng.), 14(4):311-318, Aug. 1975. 14 refs.*

The Air Pollution Control Law specifies that the dust concentration in flue gas is to be measured in accordance with JIS Z 8808 (1970). After five years of study and actual measurement, many shortcomings of the JIS method are clarified, and the modification of the JIS method is being prepared by the special committee. General description of JIS Z 8808 is given, with descriptions of problems concerning the applicable measurement range and measurement method; selection of measurement position; determination methods for flue gas temperature, moisture content, mass, and flow rate; and sampling method, including the sampling location and position, sampling procedure, sampling device, sampling tube, and methods using dust tubes and filter paper.

54985 **APTIC NO. 77203**

Inui, Tomoyuki, Junichi Kohashi, and Haruo Shingu

RAPID AND PRECISE DETERMINATION OF SMALL AMOUNTS OF NOX GAS WITH A TOTAL CONVERSION TYPE COLOR-PRODUCTION TUBE. *(Kanzen henkanshiki teiryo hashokukan ni yoru biryo no NOx gasu no jinsoku teiryo bunseki). Nippon Kagaku Kaishi (J. Chem. Soc. Japan), no. 7:1186-1192, 1975.*

The nitrogen oxides determination by a color-producing tube is described. The color-producing reagent was prepared by spraying 0.06% diphenyl benzidine solution and ammonium chloride in 75% sulfuric acid onto a silica gel of 60 to 80 mesh filled in a glass tube of 1 to 3 mm diameter and 6 to 8 cm length. From 100 to 200 ml of standard nitric oxide gas was flown through the tube using a carrier gas at a flow rate below 40 ml/min, and the length of colored reagent in the tube determined the NO concentration in the sample gas. The intensity of color was constant and uniform throughout the colored region, and it was not affected by the NO concentration. The temperature of the tube did not affect the developed length of coloration, and the length was constant between 15 to 35 C under the same experimental conditions. No effect of coexisting gases in the sample gas on the NO determination was observed by 99.9% hydrogen gas, 6% propane, 1.1% water, 270 ppm meta xylene, or 130 ppm 2-mercaptoethanol. The color reaction with NO occurred instantaneously on the surface of the reagent coated particles for the NO concentrations up to 11.4 mole when 1 mole diphenyl benzidine was coated on the silica gel. The linear relation between the length of coloration and the total quantity of NO in the sample gas was obtained. Concentrations ranging from 0.3 to 3000 ppm could be quantitated by this color-producing tube method with a precision of from + or - 0.15 to + or - 1.35.

54986 **APTIC NO. 79421**

Jacko, Robert B., David W. Neuendorf, and Kenneth J. Yost

TRACE METAL SAMPLES COLLECTED IN THE FRONT AND BACK HALVES OF THE E.P.A. STACK SAMPLING TRAIN. *J. Air Pollution Control Assoc., 25(1):1058-1059, Oct. 1975. 1 ref.*

The collection of trace metal samples in the front and back halves of the Environmental Protection Agency stack sampling train is discussed. Stack samples were obtained from a municipal incinerator, and open hearth furnace, a coke and sinter plant, and a coal fired power plant. The train was modified in each case by the use of 5% nitric acid in the first two impingers in order to trap particulate containing cadmium, lead, zinc, copper, iron, nickel which are soluble in dilute acid. A summary of the proportions of trace metal samples captured in the probe backwash, glass fiber filter, and impingers at each site is tabulated as percent of total trace metal captured. For all samples the majority of trace metals that are collected appear in the probe backwash and glass fiber filter. On the average, more than 99.5% of the Cd, Pb, Zn, and Fe collected is captured by the front half of the train, and 98% of the Ni and 98.3% of the Cu are found in the probe backwash and filter.

MEASUREMENT METHODS

54987 **APTIC NO. 79166**

Kinnison, Robert

BIOMED, SAS, AND OTHER TOOLS OF THE STATISTICIAN. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 50-55, Jan. 1975. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)*

NTIS: PB 241 150

Computerized statistical packages available to the environmental scientist are reviewed. Computer programs, algorithms, statistical techniques, and hardware are discussed in relation to the following areas of research: biological assay, epidemiology, environmental transport simulation, representative environmental sampling, chemical kinetics and equilibria, economics optimization, and dose-response studies.

54988 **APTIC NO. 78986**

Krishen, Anoop and Ralph G. Tucker

ELIMINATION OF INTERFERENCE OF ACETALDEHYDE IN GAS CHROMATOGRAPHIC QUANTITATION OF LOW LEVELS OF VINYLCHLORIDE. *Preprint, American Chemical Society, Washington, D. C., 12p., 1975. 11 refs. (Presented at the American Chemical Society Meeting, Chicago, Ill., Aug. 28, 1975.)*

A method to eliminate the interference of acetaldehyde in gas chromatographic quantitation of low levels of vinyl chloride was developed. The method used was flame ionization chromatography with glycol sodium bisulfite mixture used in the abstraction technique of Kerr and Trotman Dickenson is replaced with dry sodium bisulfite mixed with glass wool. The use of glass wool avoids any problems in gas flow due to compaction of the dry powder. A six-inch column of sodium bisulfite is installed ahead of the column. Acetaldehyde is completely eliminated and no dimunition in the response for vinyl chloride is observed. Each at the 1 ng level, the vinyl chloride peak is quantitated accurately.

54989 **APTIC NO. 76999**

Kronborg, O. J. and E. Steinnes

A ROUTINE PROCEDURE FOR MULTIELEMENT ANALYSIS OF ATMOSPHERIC PARTICULATES BY INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS. *Radiochem. Radioanal. Lett., 21(6):379-387, June 16, 1975. 12 refs.*

A neutron activation procedure for the routine determination of about 20 elements in airborne particulates is described. A short irradiation followed by one germanium(lithium) gamma-counting after 10 min permits the determination of 10 elements. The rest of the elements are determined by one counting performed 1-2 weeks after a long irradiation. Either a sandwich method or a quartz ampoule method can be employed for the long irradiation determination. Data from two detector systems are accumulated simultaneously and independently, and dead time corrections are performed with a precision pulse generator. Counting error is influenced by the counting time and the ratio of net area to background area of the peak in question. Under routine conditions, one person can run 11 samples/hr with the short irradiation. Experimental parameters used for the analysis of sodium, aluminum, chlorine, calcium, scandium, titanium, vanadium, chromium, manganese, iron, cobalt, copper, zinc, selenium, bromine, silver, cadmium, antimony, lanthanum, and mercury are provided.

54990 **APTIC NO. 79383**

Makedonskaya, R. N.

DETERMINATION OF TELLURIUM IN THE AIR IN INDUSTRIAL PLANTS. *(Opredelenie tellura v vozdukhe promyshlennykh predpriyatiy). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 6:53-55, 1975. 6 refs.*

A simple and highly sensitive method for the photometric determination of tellurium in the air is described. The sample retained on a filter is treated with a 1:1 ratio of nitric acid and hydrochloric acid, the solution is evaporated, and the residue is dissolved in a mixture composed of 11 n-solution of sulfuric acid, after which 0.5 n-solution of potassium bromide and rhodamine C are added to obtain a tellurium-bromide complex which is then extracted with a 3:1 ratio mixture of benzene and ether for the subsequent photometric measurement of the optic density at 564 nanometer in a 10 mm-cuvette. The coloration is stable for 2 hr. The sensitivity of the method amounts to 0.5 microgram. No interference was observed due to trivalent iron and manganese present in a ratio of 300:1, nor to trivalent chromium, hexavalent chromium and nickel present in a 100:1 ratio, nor to vanadium present in a 10:1 ratio, nor to a 20:1 ratio of molybdenum.

54991 **APTIC NO. 77247**

Mamuro, Tetsuo, Tadao Matsunami, Yatsuka Matsuda, Akira Mizohata, Shoji Bando, Tsuyoshi Imahashi, Yoshikazu Hashimoto, and Kenki Tomura

THE RELIABILITY OF INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS IN ENVIRONMENTAL MATERIALS. *(Kankyo shiryo ni kikiteki hoshaka bunseki no shinraisei ni kansuru kento). Text in Japanese. Radioisotopes, 24(6):423, June 1975.*

The reliability of neutron activation analysis of an airborne dust sample and the standard rock sample W-1 (US Geological Survey) was determined by analyzing these samples at four different laboratories. The ratio between the maximum value and minimum value among the averaged values at each laboratory analysis seldom exceeded 1.5 when the analyzed elements were contained in higher concentration in the samples (a few times 10 mg of element per g sample); however, whenever the analyzed elements were trace constituents of the samples, the ratio could be large. For the analysis of barium in the airborne dust sample, for example, the ratio was 4.5, and the analyzed value ranged from 130 to 770 micrograms/g sample.

54992 **APTIC NO. 75894**

Margeson, John H. and Robert G. Fuerst

EVALUATION OF A CONTINUOUS COLORIMETRIC METHOD FOR MEASUREMENT OF NITROGEN DIOXIDE IN AMBIENT AIR (FINAL REPORT). *Environmental Protection Agency, Research Triangle Park, N. C., Quality Assurance and Environmental Monitoring Lab,, Program Element 1HA327, ROAP 26AAF, Rept. EPA-650/4-75-022, 49p., April 1975. 34 refs.*

NTIS: PB 243462/AS

A continuous colorimetric procedure for the measurement of nitrogen dioxide in ambient air was evaluated. The evaluation was performed with two Technicon IV air monitors and two different azo-dye-forming absorbing solutions. A Saltzman absorbing solution was used in a modified analyzer, while the other instrument was used with a Lyshkow absorbing solution for which the Technicon IV was designed. Static calibration was not reliable, and dynamic calibration of the instruments with a reliable NO2 permeation device was necessitated. Ozone was found to be a significant negative interferent. Typical sensitivity ranges were 0-0.25 ppm, 0-0.50 ppm, and 0-1.0 ppm. Beer s law was obeyed throughout this range. The absorbance of a blank for the modified Saltzman solution showed no significant change under any exposure conditions after 27 days, whereas the Lyshkow solution showed an increase in absorbance of 0.02 absorbance units after the same period of exposure. The latter change in absorbance did not appear to represent a potential source of error in the method, however.

54993 **APTIC NO. 79454**

Marten, A. and Y. Chauvel

AN ADVANTAGEOUS TECHNIQUE OF STRATOSPHERIC EMISSION SPECTROMETRY IN THE FAR INFRARED. *Infrared Phys., 15(3):205-209, Sept. 1975. 15 refs.*

The use of emission spectrometry by Fourier transform for the multi-harmonic detection of stratospheric species such as water vapor, oxygen, ozone, nitrous oxide, nitrogen oxides, carbon monoxide, nitric acid, and sulfur dioxide is discussed. The basic apparatus used for this remote detection technique consists of a Michelson interferometer with phase modulation. The spectral range that can be explored by the method extends from 10 to 250/cm. The use of spectral data derived from different harmonics improves the mean spectral efficiency over a larger optical range. The average signal-to-noise ratio is also improved as a result of generating a composite spectrum. The method was successfully used for obtaining stratospheric emission broad-band spectra during a supersonic flight.

54994 **APTIC NO. 79134**

Martin, Ann and Max Blumer

POLYCYCLIC AROMATIC HYDROCARBONS: OCCURRENCE AND ANALYSIS - A PARTIAL BIBLIOGRAPHY. *Woods Hole Oceanographic Institution, Woods Hole, Mass., Office of Naval Research Contract N00014-74-C0262, NR 083-004, Rept. WHOI-75-22, 10p., Jan. 1975. 1055 refs.*

A bibliography of 1055 references on the occurrence of polycyclic aromatic hydrocarbons, their origin, composition, fate, and analysis is presented. The bulk of the citations refer to work reported between 1970 and mid-1973. The references are processed by computer into a bibliography consisting of four sections: the main body of references, a keyword-in-context index, an index of all authors, and a listing of journals cited in the references. The bibliography includes references obtained from a computer search of the Environmental Protection Agency's Air Pollution Technical Information Center. The bibliography is available in four forms: microfiche, hard copy, computer magnetic tape, and computer print-out. A microfiche form is included with the present report.

54995 **APTIC NO. 77197**

Matsushita, Shukaku

DEVELOPMENTS IN THE METHOD OF ANALYSIS OF CARCINOGENIC MATERIALS IN THE ENVIRONMENT. *(Kankyo hatsu gan busshitsu no bunsekiho no shinpo). Text in Japanese. Preprint, Executive Committee for Symposium of Enviornmental Sciences, Tokyo (Japan), p. 174-175, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences Lecture Meeting, 1st, Tokyo Japan, June 6-8, 1975.)*

The analysis of plural ring aromatic hydrocarbons (PAH), which are produced by incomplete combustion of petroleum, coal, and wood is discussed. The method of analysis consists of 5 basic procedures of sample collection, extraction of PAH, separation of PAH into various components, identification of each component, and quantitative determination of the components. The apparatus and methods include: a high-volume sampler and an Andersen sampler; Soxhlet extraction, vacuum sublimation, and ultrasonic extraction; liquid-liquid partition, column chromatography, paper chromatography, thin-layer chromatography, gas and high-speed liquid chromatography, and spectrophotometry, spectrofluorometry, gas chromatography, high-speed liquid chromatography, and mass spectrometry. Several years ago, it was necessary to use several micrograms of PAH for a quantitative determination. At present, it is possible to analyze even femtogram samples. Fluorescent spectrometry, mass-spectrometry, and thin-layer chromatography, and combinations of these, are currently the most promising methods.

54996 **APTIC NO. 79088**

Medecki, Hector and Daniel E. Magnus

LIQUID AEROSOL DETECTION AND MEASUREMENT. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 19p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-24.1.)*

A device for measuring liquid aerosols is described. The measurement probe is a platinum wire with a diameter of 5 micron. Changes in the probe resistance are related to the size of the impinging droplets in the gas flow, with the probe electrically heated to a predetermined temperature. The electrical signals from the probe are processed and used to classify the droplets into six different size ranges for determining the droplet size distribution and concentration. The device can also be used to measure flow velocity and flow temperature. The device is calibrated by measuring the electrical output generated by droplets over a specified size range interacting with the probe while a photograph of the individual droplet is obtained through a microscope. Field experience with the device demonstrates its success in measuring droplet distribution and concentration in the demister sections of a waste treatment plant and a coal burning power plant. Reliable information can be obtained under the following operating conditions: droplet size of 1-600 micron, flow velocity of 3 m/sec, droplet concentration of 500/cu m, and a temperature of 0-100 C. (Author abstract modified)

54997 **APTIC NO. 79002**

Murphy, Robert J. and Curtis Bond

OPTIMUM SELECTION AND PERFORMANCE OF AMBIENT AIR INSTRUMENTATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-14.1.)*

A model for evaluating various performance characteristics of air pollution monitoring instrumentation is described. The model offers a systematic mechanism to quantify such performance parameters as accuracy, precision, impact of interferents, maintainability, and simplicity of operation via a weighting technique that can be formulated to reflect a single numerical utility rating for each instrument system evaluated. Although the model can be formulated and applied over a limited time to a selected group of individual instruments, it is best employed, on a statistical basis, to be replicated instruments over time. Consequently, it cannot only be used to evaluate instruments as a selection mechanism for developing new monitoring systems, but it can also be used to evaluate the performance of existing monitoring systems or components. (Author abstract modified)

54998 **APTIC NO. 77207**

Noller, B. N. and H. Bloom

THE DETERMINATION OF ATMOSPHERIC PARTICULATE LEAD USING LOW VOLUME SAMPLING AND NON-FLAME ATOMIC ABSORPTION. *Atmos. Environ., 9(5):505-511, May 1975. 13 refs.*

The use of non-flame atomic absorption spectrophotometry to determine the lead content of airborne particulates collected during a continuous monitoring survey of the Hobart, Australia area was investigated. The sampling procedure involved the collection of particulate material from small volumes of air on a millipore filter disc inserted into a graphite sampling cup. It was possible to take five samples in the space of 2 min and complete analyses in a period of 1 hr. The non-flame atomic absorption technique gave a sensitivity of 0.2 ppm Pb, corresponding to an absolute sensitivity of 4.2 times 10 to the -11 g Pb using the 217.0 nm Pb spectral line. This was equivalent to 0.2 microgram/cu m Pb with a 200 cu cm air sample. The detection limit was equivalent to 0.48 microgram/cu m Pb for a 200 cu cm air sample and corresponded to an absolute detection limit of 9.6 times 10 to the -11 g Pb. The non-flame atomic absorption method proved to be very adaptable to the continuous monitoring survey. The atmospheric particulate lead levels found in Hobart were similar to those found in other Australian cities and other parts of the world for similar traffic densities.

54999 **APTIC NO. 77215**

Ohgi, Kiyoshisa, Hiromichi Sente, Norimitsu Kada, and Akimoto Todaka

A STUDY ON DUST MEASUREMENT AT A LIME FACTORY. *(Sekkai kojo ni okeru baijin sokutei ni kansuru kenkyu). Text in Japanese. Preprint, Agency of Industrial Technology and Science, Tokyo (Japan), p. 11-15, 1975. (Presented at the National Research Institute for Pollution and Resources Meeting, 4th, Saitama, Japan, July 9-10, 1975.)*

There are considerable difficulties in the application of the JIS (Japan Industrial Standard) 8808 method of measuring the volume of dust in stack waste gases to lime plants. By providing a hood (cylinder, 2.5 m by 2 m) of A type, or (1 m of straight tubing by 2.5 m funnel) of B type and (.05 m straight tubing by 2 m funnel) of C type, this was remedied. Experiments were conducted on filter paper, as it is easily destroyed by the mist-like water content of lime. The cellulose filter was the most effective with the least loss of pressure and strength. Glass fiber filter paper could also be used, with a protector. Care must be taken in designing a hood so as not to affect the waste gas volume.

55000 **APTIC NO. 79089**

Ootsuka, K

NEW TYPE STACK DUST MONITOR. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-24.4.)*

An apparatus for continuously measuring the mass concentration and particle size distribution of suspended particulate matter in flue gas is described. The device is based on the forward light scattering method. Stack gas is sucked by an air pump into a light sensor, and the light scattered by the dust particles is detected with a photo-multiplier. A direct sampling system is used to measure low particulate concentrations (0-10 mg/cu m), and a dilution sampling system is used to measure concentrations in the 10-1000 mg/cu m range. The apparatus also includes an isokinetic sampling system. (Author abstract modified)

55001 **APTIC NO. 77281**

Ott, Wayne R.

DEVELOPMENT OF CRITERIA FOR SITING AIR MONITORING STATIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 14 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-14.2.)*

The development of uniform national criteria for siting air monitoring stations is discussed. A scheme is presented for classifying all monitoring stations into six different siting categories. Type A stations are designed to provide a realistic measure of pedestrain exposures, while Type B stations measure the background concentration extending over a large physical area. Type C stations monitor residential or suburban population exposures. Types D, E, and F are for more specialized purposes such as collecting meteorological information and conducting air quality surveys. Types A, B, and C, which are the most important in implementing air quality standards, must have a uniform probe height of 3 + or - 1/2 m. (Author abstract modified)

55002 **APTIC NO. 77283**

Ott, Wayne R. and David T. Mage

RANDOM SAMPLING AS AN INEXPENSIVE MEANS FOR MEASURING AVERAGE ANNUAL AIR POLLUTION CONCENTRATIONS IN URBAN AREAS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 25p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75.14.3.)*

A computer program was developed that selects values, at random, from any year of hourly air quality data. The program was run using carbon monoxide concentrations from an actual city to determine the error introduced by random sampling, and the results were compared with predictions of the central limit theorem. Predicted and computed results showed excellent agreement, providing a solid basis for calculating 95% confidence intervals, regardless of whether the original distribution is lognormal or not. Data from 84 American cities were examined and revealed that random sampling yields a relatively precise estimate of the annual average concentration with only a small number of samples. With 144 samples, 94% of the cities showed a 95% confidence interval for the annual CO average within + or - 0.8 ppm. With 100 samples, the 95% confidence interval was within + or - 1 ppm for 94% of the cities. Cost reductions of 75% can be achieved by using random sampling in place of continuous monitoring approaches. (Author abstract modified)

55003 **APTIC NO. 79389**

Pella, P. A., E. E. Hughes, and J. K. Taylor

DEVELOPMENT OF GAS-BLENDING SYSTEMS FOR CALIBRATION: APPLICATION TO HYDROGEN FLUORIDE, ARSINE AND PHOSGENE IN AIR. *Am. Ind. Hyg. Assoc. J., 36(1):755-759, Oct. 1975. 9 refs.*

Gas blending systems for calibrating analytical monitoring devices were developed and applied to hydrogen fluoride, arsine, and phosgene in air. A high concentration of the standardized gas mixture is dynamically diluted with air or nitrogen to obtain the desired concentration levels. The standardized gas mixtures are measured periodically to determine any changes with time in the concentrations. Gas mixtures prepared by dilution were measured and compared with values calculated from the gas blending data. Hydrogen fluoride in the standardized mixture and in the gas mixtures prepared by dilution was determined by potentiometry employing a fluoride ion specific electrode. Arsine and phosgene gas mixtures are determined by spectrophometric methods. Phosgene in a standardized gas mixture is measured by coulometric titration at constant current. These gas mixtures are measured in the concentration ranges from 1-60 ppm for HF, from 0.02-0.2 ppm for arsine, and from 0.05-5.0 ppm for phosgene. These concentrations represent from 0.5 to 5 times the threshold limit value for these gases.

55004 **APTIC NO. 77085**

Pena, J. A., J. M. Norman, and D. W. Thomson

ISOKINETIC SAMPLER FOR CONTINUOUS AIRBORNE AEROSOL MEASUREMENTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-40.2.)*

An isokinetic probe for the continuous sampling of aerosol size distributions from small or medium sized aircraft is described. The sampler is located above the roof of the cabin outside the aircraft boundary layer. Air enters the sampler through a circular intake, and its velocity is reduced as the cross section of the intake increases along a 7 deg conical diffuser. The expansion cone terminates in a cylindrical chamber in which the air velocity is 1/16 the aircraft speed. Behind the sampling chamber the air is accelerated in a second conical section to an exhaust port. Exhaust port pumping is used to compensate for internal losses, thus preserving the isokinetic nature of the sampler. Tubes leading to individual instruments are located in the sampling chamber and may be individually adapted to match the air sampling velocity with the local air speed inside the sampling chamber. The level of sampling turbulence in the sampling section is about 0.05. Wind tunnel and field tests verify the effectiveness of the sampler. (Author abstract modified)

55005 **APTIC NO. 77089**

Raabe, Otto G.

AEROSOL AERODYNAMIC SIZE CONVENTIONS FOR INERTIAL SAMPLER CALIBRATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-50.3.)*

Conventions for inertial sampler calibrations are discussed. The use of the aerodynamic resistance diameter rather than the aerodynamic equivalent diameter for the calibration of inertial samplers simplifies calculations, eliminates dependence on barometric pressure, and illustrates the laws controlling particle separation in the Stokes regime. Corrections for different operating conditions are based only on the change in the viscosity of the air which depends solely on the temperature. This correction is normally small and can usually be ignored without significant error. The general definition of the aerodynamic equivalent diameter possesses the advantage of being applicable to both very small particles in viscous motion in the air under the Stokes law and to particles whose motion with respect to the air is not adequately described by the Stokes law alone with appropriate changes in mathematical formulations. The aerodynamic resistance diameter is recommended for the calibration of inertial samplers used for collecting aerosols in the respirable size range. (Author summary modified)

55006 **APTIC NO. 79382**

Renoux, A., J. F. Butor, and G. Madelaine

APPLICATION OF STATISTICAL METHODS TO THE STUDY OF THE GRANULOMETRIC DISTRIBUTION OF ATMOSPHERIC AEROSOLS. *(Application des methodes statistiques a l etude de la repartition granulometrique des aerosols atmospheriques). Text in French. Chemosphere, 4(3):145-150, June 1975. 8 refs.*

Statistical treatment of atmospheric aerosol concentrations measured in Brest, a town with low pollution level, and other places by electron microscopic examination of samples collected by means of Andersen cascade impactor and nucleopore filter is presented. The granulometric distribution was calculated according to Butor s method. Gaussologarithmic curves composed of three distinct sections were obtained for most of the sampling areas for the fraction comprising between 0.008 and 1 micron. Calculations of the cumulative frequency percentages with respect to the breaking points of the granulometric distribution curve yield three independent Henry log-normal distributions.

55007 **APTIC NO. 79385**

Rigaud, A.

CRITICAL REVIEW OF METHODS FOR THE DETERMINATION OF SULFUR DIOXIDE AND NITROGEN OXIDES IN BACKGROUND POLLUTION. *(Revue critique des methodes de dosage du dioxyde de soufre et des oxydes d azote en pollution de fond). Text in French. Meteorologie, 5(33): 33-46, Jan.-March 1975. 14 refs.*

Methods developed for the determination of sulfur dioxide, nitric oxide and nitrogen dioxide in background pollution are reviewed. Conductimetry using hydrogen peroxide is nonspecific for SO2, and coulometry with bromine is inaccurate due to the possible interference of nitrogen dioxide. Therefore, these two methods should be abandoned in the determination of SO2. Nephelometry with barium sulfate is time-consuming and delicate, and it requires new reference samples for each determination. Flame photometry is suitable for the determination of SO2, and especially for its differentiation from other sulfur compounds. Practically all known colorimetric methods are suitable for the determination of SO2, even though they are rather time-consuming, except for the iodimetric method. The high-precision isotope dilution method is specific even for the iodimetric method. The high-precision isotope dilution method is specific even for trace quantities of SO2 in the air. The diphenylamine and phenol 1,2,4-disulfonic acid methods are not satisfactory for the determination of nitrogen oxides. The chemiluminescent, Griess-Saltzmann-Illosvay, and the colorimetric methods in general are best suited for the determination of nitrogen oxides. However, these methods require a better knowledge of the transformation of nitrogen dioxide into nitric oxide.

55008 **APTIC NO. 79363**

Robertson, David J., Richard H. Groth, and Ernest G. Glastris

IMPROVEMENTS IN PHENOLDISULFONIC ACID METHOD FOR DETERMINATION OF NOX. *Environ. Sci. Technol., 9(10):979-981, Oct. 1975. 3 refs.*

Improvements in the phenoldisulfonic acid method prescribed by the Environmental Protection Agency for determination of nitrogen oxides were developed. Standard solutions of potassium nitrate are used to eliminate gas sampling variables. Specific recommendations are these: use borosilicate glass vessels for evaporation step but discard etched dishes and samples containing precipitate; avoid platinum dishes; add sodium hydroxide only to the neutral point without excess; increase the amount of ammonium hydroxide added to 15 ml; and read absorbance at 405 nm. Samples of nitric oxide in nitrogen analyzed by the modified method and chemiluminescence agree within 1.5% on average. (Author abstract modified)

55009 **APTIC NO. 79425**

Robinson, J. W., Jerry Rhodes, and D. K. Wolcott

THE DETERMINATION AND IDENTIFICATION OF MOLECULAR LEAD POLLUTANTS IN THE ATMOSPHERE. *Anal. Chim. Acta, 78(2):474-478, Sept. 1975. 2 refs.*

A procedure for the determination and identification of molecular lead pollutants in the atmosphere is described. The particulates are filtered out on a graphite disc. The filtered air is then drawn through a carbon bed, made of pure activated in situ, which is maintained at room temperature and effectively absorbs the non-filterable lead. Air is drawn through the system at a flow rate of 200 cu cm/min. The air flow is stopped and the carbon bed is heated in 1500 C. Non-particulate Pb compounds and very small particulates adsorbed on the carbon bed are atomized into the vapor phase and swept with a stream of cleaned air into the cross piece of the atomizer where they are determined by atomic absorption spectrometry. For this, the molecular Pb in the air is calculated. The filter, containing particulate Pb, is dropped onto the hot carbon bed. Free Pb atoms are swept into the cross piece and measured by atomic absorption spectrometry. With this technique it was attempted to determine the source of molecular lead. Molecular lead may first reach the atmosphere by being burned in automobiles, leaving the exhaust as inorganic lead in particulate form, and falling on the highway where it is exposed to traffic, sunlight, and humidity. The elevated temperatures may cause slight but significant evaporation of the lead salts, generating molecular lead pollutants. Molecular lead may pose more of a health hazard than particulate lead.

55010 **APTIC NO. 79411**

Sato, Shin

DETERMINATION OF ODOR AND STATISTICAL METHOD (II): NORMAL DISTRIBUTION. *(Nioi no sokutei to tokeiteki hoho (sono II): Seiki bunpu no* *hanashi). Text in Japanese. Asushu no Kenkyu (Odor Control Assoc. J.), 4(20):1-7, May 1975.*

The application of normal distribution theory to the determination of odor density is discussed. The basic theory of Gauss s distribution, cases of normal distribution and Poisson s distribution, central values of distribution, normalization of normal distribution and effects of normalization are described with examples of the calculation method. The concept of a five-point evaluation system and description and theoretical bases of the six-point indication system for odor intensity are given. The significance of normal distribution and the frequency of its occurrence in the natural environment are also discussed.

55011 **APTIC NO. 77025**

Schneider, Werner and Johann-Christian Frohne

MEASUREMENT AND EVALUATION OF HYDROCARBON IMMISSIONS. I. SAMPLING AND GAS CHROMATOGRAPHIC ANALYSES OF HYDROCARBON IMMISSIONS. *(Messung und Auswertung von Kohlenwasserstoff-Immissionen. Teil I. Probenahme- und gaschromatographisches Analysenverfahren fuer Kohlenwasserstoff-Immissionen). Text in German. Staub, Reinhaltung Luft, 35(7):275-281, 1975. 29 refs.*

A procedure for sampling and analysis of hydrocarbon immissions in the range carbon 1 to carbon 8, having a detection limit of several micrograms/cu m is described. Discontinuous sampling was done with special gas-collecting pipettes, the analysis by gas chromatography after enrichment. Analysis comprised the total hydrocarbons components, methane, ethane, ethylene, propane, propylene, C4, C5, C6 hydrocarbons and higher, benzene, toluene, and C8 aromatics.

55012 **APTIC NO. 78992**

Sinclair, David, Richard J. Countess, Benjamin Y. H. Liu, and David Y. H. Pui

EXPERIMENTAL VERIFICATION OF DIFFUSION BATTERY THEORY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1975. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-41.4.)*

Measurements of singly charged monodisperse aerosols ranging in size from 0.01-0.1 micron with a General Electric and a Pollak condensation nucleus counter were performed to assess the aerosol penetration through the stages of a set of portable diffusion batteries in series. The diffusion battery, an assembly of circular tubes or rectangular channels, is one of the best devices available for measuring the size and size distribution of submicron aerosols in the diameter range of 0.002-0.2 micron. Particle sizes in the range tested were selected at will by adjusting the voltage of an electric mobility classifier. The fraction of aerosol of a given size range passing through each battery agreed closely with the penetration calculated from molecular diffusion theory for that size. This indicated that the theory was correct and confirmed that the aerosol produced by the electric mobility classifier was monodisperse. The difference in penetration between a charged versus a neutralized aerosol was insignificant except for the smallest aerosols used. (Author abstract modified)

55013 **APTIC NO. 77258**

Steele, R. D., G. C. Page, and G. F. Meenaghan

STACK SAMPLING OF HYGROSCOPIC PARTICULATES IN AN ENTRAINED WATER ENVIRONMENT. *J. Air Pollution Control Assoc., 25(6):634-635, June 1975. 1 ref.*

A particulate sampling train was developed for sampling magnesium chloride in hydrate forms emitted from a magnesium chloride spray drier. A 3/4 in. diameter, sharp edge nozzle was used as the sampling probe. Stack samples were isokinetically drawn through the sample probe into a heated impinger-settler, which was kept at stack conditions and designed to remove all the entrained water from the stack sample. The entrained water was collected and analyzed for total dissolved and suspended solids. The sample next was passed through a glass fiber filter, where the remaining particulates were collected. The filter media was kept at the stack temperature during sampling. After the blower, the air passed through an orifice plate. The pressure drop across the orifice was monitored by a manometer. From this pressure drop and suitable temperature corrections, isokinetic sampling was insured and the air flow rate through the sample train was calculated. The amount of collected particulates was determined by obtaining the weight of the dissolved and suspended solids (TDS and TSS) in the collected entrained water and the weight of the solids collected on the filter media. Preliminary tests concluded that magnesium chloride at stack conditions was in the dihydrate form ($MgCl_2.2H_2O$) and the magnesium chloride in the entrained water was in the hexahydrate form ($MgCl_2.6H_2O$). The TDS and TSS were assumed to be $MgCl_2.6H_2O$ and the particulates on the filter media were assumed to be $MgCl_2.2H_2O$. Particulate emission concentrations were then calculated using these hydrate fractions. This sample train design allows an accurate method for sampling hygroscopic materials in an entrained water environment. (Author abstract modified)

55014 **APTIC NO. 79405**

Tajiri, A.

AEROSOL WEIGHT CONCENTRATION MEASURING METHOD. (I). *(Earozoru no juryo nodo sokutei ho). Text in Japanese. Saiko to hoan (Mining and Safety), 21(7):353-365, July 1975. 85 refs.*

Aerosol weight concentration measuring methods, including dust tube method, cyclone sampler, high-volume sampler, and high- volume type cascade impactor are reviewed. The dust tube method uses a hard-glass tube packed with glass wool at a packing density of 0.25 g/l for a total length of 50-180 mm, or with round or cylindrical filter papers. The total dust concentration in waste gas was calculated at 0 deg and 1 atm on a dry basis. A cyclone sampler is used when the waste gas contains higher concentrations of aerosol with a particle size distribution greater than 5 micron. A cyclone sampler developed by Thermix Co. using a damper to adjust the flow rate was able to collect nearly 100% of the aerosol in waste gas. A high-volume sampler is used for obtaining the total airborne particulates concentration and for the analysis of the components. The suction pump is operated by two, 100 V centrifugal motors and the total flow rate is measured by using an integral flow meter. Rain, large particles (20 micron up) and dusts on ground are prevented from going into the sampler by using a shelter on top of the sampler. A high- volume type cascade impacter is designed to give the particle size distribution from the weight concentration distribution. It can be employed for sampling aerosols having a wide range of particle size distribution.

55015 **APTIC NO. 79489**

Uchida, Yoshiaki, Yasuji Koyama, Takashi Chihara, and Kogoro Maeda

APPLICATION OF MASS FILTER SYSTEM TO AN ANALYSIS OF TRACE COMPONENTS IN THE ATMOSPHERE: II. POSSIBILITIES OF SIMULTANEOUS ANALYSIS OF MULTI-COMPONENTS AND ACCOMPANYING PROBLEMS. *(Taikichu no biryo seibun bunseki e no masu firuta no tekiyo: II. Taseibun doji bunseki no kanosei to sono mondaiten). Text in Japanese. Shitsuryo Bunseki (Mass Spectroscopy), 23(1): 69-78, March 1975. 11 refs.*

Applicability of a mass filter system to simultaneous analysis of multi-components was examined with three gaseous sulfides (carbon disulfide, methyl mercaptan, hydrogen sulfide) in nitrogen dilutant. Sample gas was prepared by using a standard gas effluent system based on the permeation principle, and introduced directly into the analyzer system through a glass capillary leak. Reasonably good response between peak heights and concentrations was obtained for the three components in the following ranges: CS2, 30-0.3 ppm; CH3SH, 20-5 ppm; H2S, 30-3 ppm. Deviations from the linear response were found in the range below 2-3 ppm for CH3SH and H2S. Deviations probably arise from adsorption and reaction of the components on the inner surfaces of the glass and stainless steel pipe used in sample introduction. The present results indicate good adaptability of the mass filter system to simultaneous analysis of multi- components. Importance of sample introduction procedures in trace component analysis is also suggested.

55016 **APTIC NO. 79427**

Willeke, Klaus

PERFORMANCE OF THE SLOTTED IMPACTOR. *Am. Ind. Hyg. Assoc. J., 36(9):683-691, Sept. 1975. 7 refs.*

Criteria for determining the performance of the slotted impactor were determined. Slotted impactors perform with a sharpness of cut close to the theoretically predicted value, if used under the conditions of the numerical model. The blending through a 90 degree angle at the entrance of a stage in a cascade impactor shifts the collection efficiency curve and decreases the sharpness of cut. Additional stages should not be mounted on top of a given impactor without calibrating the new impactor stage combination. Single stage calibration does not give the characteristic of that stage in the entire impactor. Inlet shaping improves the sharpness of cut and reduces interstage losses. Glass fiber paper, generally used to reduce particle bounce, shifts the collection efficiency curve and decreases the sharpness of cut. (Author conclusions modified)

55017 **APTIC NO. 76946**

Yatabe, Teruo

DETERMINATION OF SO2 IN ATMOSPHERE WITH FLAME PHOTOMETRIC SO2 ANALYSER -- STUDIES ON DETERMINATION OF SULFUR DIOXIDE IN ATMOSPHERE: PART IX. *(Enko kodo kenshutsuho (FPD ho) ni yoru taikichu no SO2 solutei -- Taiki chu no io sankabutsu sokutei ho ni kansuru kenkyu: Dai 9 ho). Text in Japanese. Denryoku Chuo Kenkyusho Gijutsu Daiichi Kenkyusho Hokoku (Tech. Lab., Central Res. Inst. (No. 1) Electric Power Ind. Rept.), no. 74091:1-16, May 1975. 6 refs.*

Four flame photometric sulfur dioxide analyzers including a Meloy SA-183, a Horiba APSA-500, a Shimazu SFM-2A, and a Bendex 8300 model were tested for their performances. The measurement ranges of the apparatus ranged from 0-0.1 ppm to 0-1.0 ppm and sampling velocity ranged from 0.07 l/min to 0.2 l/min. The results are as follows: reproducibility: less than 4% to full scale; stability: less than 0.5% and 4% to the full scale at zero drift for 24 hr and at span drift for 15 hr, respectively; response time: less than 4 min for 90% rise time and less than 2 min for 90% fall time; and response to carbon dioxide at 280 ppm as interfering component: 13% and 3% to full scale for normal pressure type, respectively. Field tests of the analyzers showed good agreement in general with the results obtained by the pararosaniline method.

55018 **APTIC NO. 77044**

Yoshida, Hideto, Ken Osugi, Hiroaki Masuda, and Koichi Iidani

EFFECTS OF RESUSPENSION IN NON-SUCTION DUST SAMPLING. *(Mukyuin dasuto sanpuringu ni okeru saihisan no eikyo). Text in Japanese. Preprint, The Society of Chemical Engineers Japan (Tokyo), p. 314-315, 1975. 3 refs. (Presented at the Society of Chemical Engineers Japan, Lecture Meeting, Nagoya, Japan, April 2-4, 1975.)*

Dust-sampling was carried out by a non-suction method, and the trapping effect was examined. The viscosity of gas was taken into consideration in making calculations. The particle trapping effect under non-suction conditions was in keeping with the calculation of potential current, within the small range of particulate inertia. The observed trapping effect, when the inertia parameter is large, decreases because of the reflying effect. The reflying ratio became greater as wind velocity increased, although reflying depends upon particle characteristics and the measurement method. By estimating the sampling time to be zero, a figure closer to the theoretical value may be obtained, although there is still some deviation.

55019 **APTIC NO. 77256**

Yoshida, R., S. Sekigawa, H. Koike, and Y. Imatake

MINICOMPUTER APPLICATION IN POLLUTION MONITORING SYSTEM. *(Kogai kanshi system ni okeru minicomputer no riyo). Text in Japanese. Nippon Denki Giho (Tech. Rept. Nippon Electr. Co., Ltd.), no. 2:18-24, March 1975. 2 refs.*

The fundamental concepts of air pollution monitoring by minicomputer were described from software and hardware viewpoints. A real time monitor is used for air pollution monitoring. The real time monitor is capable of operating 32 tasks simultaneously. The monitor continuously monitors the tasks and the control is based on the principle that the highest task in line at READY condition is allocated to the control program unit. A task control block is required for controlling each task and the monitor gives various macroinstructions to the tasks. The data collected by an air pollution control system are between 100 and 1500 pieces, which are put into the control program unit every 10 minutes. Control of the file of the calculated results is made by a common subroutine for all the tasks. The input- output channel of the hardware of the monitor consists of 8 data buses, 8 address buses, 7 control signal lines and 11 interruption lines. The input interface uses interruption priority lines for the input of telemeter and the control board, and the output interface controls the output of the display board and the paper tape.

55020 **APTIC NO. 79452**

Zutshi, P. K. and T. N. Mahadevan

ELECTRO-DEPOSITED LEAD DIOXIDE PLATES: A NEW TECHNIQUE FOR SULFATION RATE STUDIES. *J. Air Pollution Control Assoc., 25(8):856-857, Aug. 1975. 11 refs.*

A technique for measuring sulfation rates which obviates difficulties encountered with Huey plates in tropical climates (e.g., peeling and other damage) is described. The technique involves coating graphite plates with electrodeposited lead dioxide layers. After exposure to the atmosphere, the electrodeposited plates are separately placed in baths containing 10% sodium carbonate solution. The plates are then washed with small amounts of distilled water, and the washings are added to the respective baths. Sulfur trioxide estimations are made from the filtrates of each bath. The electrodeposited plates give sulfation rates which on the average are about 6.2% higher than those obtained for Huey plates. The technique eliminates the necessity of preparing fresh plates for each sampling period and avoids the waste of unused lead dioxide and other binding ingredients.

55021 **APTIC NO. 76976**

SPECIFIED BY JIS: LIGHT SCATTERING TYPE PARTICLE COUNTER. *(Jis genan: hikari sanran shiki ryushi keisu ki). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 13(2):48, June 1975.*

The draft of the Japan Industrial Standard for particle counters of the light scattering type is summarized. The particle counters must have the capability of counting 0 to 10,000 particles/l concentration of particles sized greater than 0.5 micron without any dilution, or 0 to 10,000 particles for 1-minute intervals. The variation of air flow should be within 2% in 1 hr. The warm-up period of the counters should not exceed more than 1 hr. The sample air must be flown through the counter at least 1 min before making the measurement. The adjustment of the counters must be made at least once a year, and can be made many times if necessary.

55022 **APTIC NO. 77003**

First Technical Lab. (Japan)

THE MEASUREMENT OF CLASSIFIED FALLOUTS BY FLUORESCENT PARTICLE TRACERS. *(Keiko ryushi tracer ni yoru koka baijin senbetsu sokutei ho). Text in Japanese. Denkenho (Rep. Inst. Electr.), no. 36:7-11, April 1975. 3 refs.*

The application of fluorescent tracer particles to the determination of the origin of particulate fall out was investigated. The fluorescent particles were injected directly into stack smoke. Sample collection was via the dust jar method. The fluorescent particles were mostly zinc sulfide which fluoresces green, yellow, or orange on illumination with ultraviolet light. The particles were counted for the size ranges 3.5-7, 7-11, 11-25, 25-35, and greater than 35 micron. The number of all the tracer particles was calculated from the area of the filter and the counted area under a microscope. For the calculation of diffusion, the Sutton equation was adopted. When the fall out velocity was more than 0.015 m/sec for particles 11 micron in diameter, the Sutton equation held well. For automated determination, the difference of the decay time of fluorescence between natural substances and the tracer particles was used. When green tracer particles were used, the residual fluorescence at 4 milliseconds after ultraviolet illumination was exclusively that of the tracer particles.

55023 **APTIC NO. 77205**

SPECIFIED BY JIS: MEASURING METHOD OF SUSPENDED PARTICULATE IN THE CLEAN ROOM. *(JIS genan: kurin rumu chu ni okeru fuyu biryushi no sokutei hoho). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 13(2):41, June 1975.*

The draft of the Japan Industrial Standard for the measurement method of suspended particulate concentration in clean rooms is summarized. The standard recommends two methods; the microscope and the automated particle counter. The former method counts microscopically the number of particles greater than 5 micron collected on a membrane filter using a microscope, and the latter determines the number of suspended particles sized greater than 0.5 micron continuously by means of light scattering. The membrane filter recommended is 47 mm in diameter with 0.8 micron pore size, through which the room air is sucked at the rate of 10 l/min for 30 min. The magnification of the microscope is also specified; 100 power magnification should be used in counting the particles sized between 5 micron to 50 micron, and the 50 power magnification is used for particles greater than 50 micron. The location and numbers of measurements are also specified depending on the size of rooms. For rooms less than 15 sq m, measurements at two different locations are required; five locations must be used for the rooms less than 100 sq m size, and four additional locations are required with every 100 sq m of increasing room space. The height that the room air is collected from is 100 cm from the floor.

1974

55024 **APTIC NO. 79072**

Arnold, James T. and Paul Robbiano

AIRBORNE VAPOR SURVEILLANCE SYSTEM (FINAL REPORT). *Varian Associates, Palo Alto, Calif., Army Contract DAAD05-70-C-0197, Rept. LWL-CR-03-P-68B, 49p., June 1974.*

NTIS: DDC: AD 785585

The design of a transportable membrane separator-mass spectrometer system for the detection of trace vapors in the ambient atmosphere is described. The system is suitable for installation in an airborne or ground vehicle and is designed to be used for plume intercept detection of effluents generated by a given target. The equipment is fully computer controlled with on-line data processing and digitally controlled displays. Organic vapors such as those given off by explosives can be detected at levels as low as 1 ppb.

55025 **APTIC NO. 79082**

Becker, W.-J. and W. Breuer

DEVELOPMENTAL STATE AND CALIBRATION OF APPARATUS FOR MEASURING GASEOUS AIR CONTAMINANTS. *(Zum Entwicklungsstand und zur Kalibrierung von Messeinrichtungen fuer gasfoermige Luftverunreinigungen). Text in German. PTB-Mitt., 84(2):93-103, 1974. 24 refs.*

The general problems of the measurement of gas traces are briefly discussed. These basic considerations resulted in the development of electrochemical gas trace detectors with organic fixed electrolyte systems according to the principle of fuel cells which give a measuring effect only when the component to be measured exists. A continual flow of test gas with the trace component to be measured is needed for calibrating continuous gas analyzing instruments. A general survey of all possible methods is given. Based on a list of the error and disturbance quantities, it is possible to evaluate and estimate the different calibration methods. A calibration station with rotating stopcocks is described for the calibration of gas analyzing instruments. Its construction and functioning are explained. (Author abstract)

55026 **APTIC NO. 75925**

Belyakov, A. A. and L. T. Kurenko

TOXIC VAPOR BATCHMAKER. *(Dozator parov toksicheskikh veshchestv). Gigiena. i. Sanit., 39(5):61-63, May 1974. 5 refs. Translated from Russian, 5p.*

A variable concentration of toxic vapor batchmaker for studying the sorption of toxic vapors at low concentrations is described. The device consists of a U-shaped glass tube with inlet and outlet ends which is inserted into a glass vessel. Vapors are drawn into the batchmaker by vacuum while the other end of the inserted tube is closed. A suspension of the substance or its solution can also be vaporized in the batchmaker. Absorbing instruments are attached to the outlet end of the batchmaker. Dry air is aspirated through the system at a rate of 0.3-0.5 l/min when necessary. The instrument operates on the principle of gas stream dilution.

55027 **APTIC NO. 79093**

Brenchley, David L., C. David Turley, and Raymond F. Yarmac

USE OF THE EPA PARTICULATE TRAIN FOR COMPLIANCE TESTING. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 4, p 73-85. 7 refs.*

A specific sampling procedure has been developed, known as Environmental Protection Agency Method 5, for conducting source compliance tests. The EPA Method 5 in essence refers only to dry particulate at 250 F. The sampling train is described, including the nozzle and probe, the pitot tube, the filter, the cyclone, the impingers, the sampling box, the umbilical cord, and the meter box. The performance, and hence calibration of the orifice meter is of primary importance and is critical to the maintenance of isokinetic conditions. The other critical pieces of equipment are the pitot tube and dry gas meter. Routine maintenance and calibration procedures are outlined. The test procedures are also included. Care must be taken in shutting down the sampling equipment at the end of the sampling period.

55028 **APTIC NO. 77180**

Condomitti, Agostino

PRELIMINARY STUDY ON THE USE OF THE ELECTRON SWEPT MICROSCOPE, WITH SOLID STATE ANALYZER, FOR THE RESEARCH OF POLLUTING

SUBSTANCES. *(Studio preliminare sull applicazione del microscopio elettronico a scansione con analizzatore allo stato solido (SEM-ED) allo studio di sostanze inquinanti). Text in Italian. Securitas (Rome), 59(7):421-467, 1974. 17 refs.*

The use of the electron swept microscope in conjunction with a solid-state analyzer for studying pollutants like asbestos fibers and welding fumes that are sampled on membrane filters is discussed. The method allows for morphologic studies as well as the semi-quantitive analysis of elements in individual particles having a diameter of up to 0.5 micron. The scattering of an element on a predetermined area can also be studied. The use of an image analyzer computer with the microscope allows for quicker analyses and greater statistical reliability.

55029 **APTIC NO. 79112**

Conkle, James P., William W. Lackey, and Richard L. Miller

CRYOGENIC SAMPLING OF TURBINE ENGINE EXHAUST. *Air Force School of Aerospace Medicine, Brooks AFB, Tex., Aerospace Medical Div., 62202F/7164-16-06, Rept. SAM-TR-74-54, 10p., Nov. 1974.*

NTIS, DDC: AD A003627

A multistage cryogenic trapping system was used to sample and concentrate organic constituents from turbine engine combustor exhaust. Two different fuels and additive were used. Analyses were conducted by a gas chromatograph-mass spectrometer coupled with a data acquisition system. A 2-minute sample collection, although inadequate for quantitative analysis of individual compounds, showed significant differences in the character of organic compounds in combustor exhaust between neat fuels and fuels containing organometallic smoke abatement additives. The amount of organic material collected from the exhaust gases was substantially less than expected, due in part to deposition of sample in the unheated transfor lines. The additional cryogenic transfer at -78 C prior to analysis proved useful for concentration purposes, but introduced a degree of uncertainty in the data owing to possible loss of lower boiling compounds. (Author abstract modified)

55030 **APTIC NO. 79465**

Cox, Paul F.

ENVIRONMENT MONITORING DEVICE AND SYSTEM. *(Texas Instruments Inc., Dallas, Tex.) U. S. Pat. 3,831,432. 8p., Aug. 27, 1974. 8 refs. (Appl. Sept. 5, 1972, 17 claims).*

An environmental monitoring device that utilizes adsorption field effect transistors having chemically specific films in the gate region to enable preferential adsorption of selected substances from media such as air, blood, and breath samples is described. The system includes a set of such sensors to provide outputs responsive to the substances adsorbed from the environment. At least one of the sensors produces an output which differs from the others in its response to at least one substance being monitored. The adsorption of substances in the gate region of the field effect transistors sets up a localized field which causes the bulk semiconductor material to accumulate charges near the channel surface to offset this field. The effect of surface contaminants is strong enough to modify the channel conductance. Silyl derivatives with substituted amino functional groups, ethylenic linkages, and phenyl groups can be used for films that interact with nitric oxide and nitrogen dioxide. Silyl derivatives that interact with sulfur dioxide include those containing hydroxyl substituents, amide, and imidazole groups, as well as unsaturated hydrocarbon derivatives. Carbon monoxide is more strongly adsorbed by halogenated silanes than by hydrocarbon derivatives.

55031 **APTIC NO. 77035**

Eba, H.

EMISSION SPECTROGRAPHIC DETERMINATION OF METALS IN AIRBORNE PARTICULATES AND AUTOMATIC COMPUTATION WITH SMALL COMPUTER. *(Fuyufunjin chu kinzoku genso no hakkobunko bunseki to kogata denshi keisanki ni yoru sono data shori). Text in Japanese. Aichi-ken Kogai Chosa Senta Shoho (Rept. Environ. Pollut. Res. Cent. Aichi Pref.), no. 2:125-130, 1974. 4 refs.*

An on-line system using a small computer was developed for the analysis of emission spectrographic dry-plates and applied to to the determination of metals in airborne particulates. Descriptions of sample preparation, computer processing, computer systems and analysis programs are given with block diagrams and flow sheets. The greatest merits of automated analysis of spectrographic dry-plate are the reduction in processing time and accuracy. The analytical computation processing of one dry-plate containing 15 samples can now be done in 2 hr. Calibration curves for cadmium, nickel, manganese, chromium, zinc, copper, lead, and vanadium and analytical line pairs obtained are given. The measurement results of metals in airborne particulates using these calibration curves were satisfactory.

55032 **APTIC NO. 79484**

Fuse, Michio, Makoto Noshiro, and Tomio Yarita

DETERMINATION OF BROMINE IN EXHAUST GAS BY THE USE OF A BROMIDE ION SENSITIVE ELECTRODE. *(Haigasu chu no shuso no ion denkyoku ni yoru teiryo ho). Text in Japanese. Asahi Garasu Kenkyusho Hokoku (Rep. Res. Lab., Asahi Glass Co., Ltd.), 24(2):181-185, 1974. 9 refs.*

Bromine in exhaust gas was determined by using the bromide specific electrode. Stable potential during measurement was obtained by stirring the test solution with a magnetic mixer. Suitable pH range for bromide determination was from 3 to 9. Ionic strength was kept constant with sodium sulfate. Conversion to bromide of BrO(1-) or BrO3(1-), formed in absorbent solution (sodium hydroxide), was effected with acidic sodium sulfite). To avoid interference by residual (SO3(2-), due to low solubility of silver sulfite (Ag2SO3), SO3(2-) was oxidized with hydrogen peroxide to sulfate, using methyl orange as indicator. Determination of 10 ppm bromide ion was not affected by the presence of chloride ion (up to 50 ppm sodium chloride). Concentration of bromide ion was estimated from the calibration curve, and bromine concentration in exhaust gas was calculated. This method is valid when there is more than 1.8 mg Br/N cu m in exhaust gas, when 30 liter of sample gas is taken. Analytical results by the present method for different exhaust gases were compared, and found to be in good agreement with results from the hypochlorous acid method. However, higher values resulted from the ion sensitive electrode method (0.79-3.9 mg Br/cu m), than from the hypochlorous acid method (0.63-3.5 mg Br/cu m). Incomplete oxidation of bromine to bromate ion by sodium hypochlorite is suggested as a reason. (Author abstract modified)

55033 **APTIC NO. 79003**

Greifer, B., B. C. Cadoff, J. Wing, and J. K. Taylor

DEVELOPMENT OF SOLID STATE SAMPLERS FOR WORK ATMOSPHERES (SEMIANNUAL REPORT). *National Bureau of Standards, Washington, D. C., National Institute for Occupational Safety and Health Proj. 3104150, Rept. NBSIR 74-527, 28p., June 1974. 57 refs.*

NTIS: COM-74-11720

Evaluations of the efficiency of solid sorbents for collecting trace quantities of hydrogen fluoride, phosphine, hydrogen cyanide, chlorine, and fluorine in occupational atmospheres are presented. Sodium acetate is a very efficient sorbent for hydrogen fluoride, and its solubility in water is highly advantageous for subsequent HF determination by ion selective electrode. Potassium permanganate impregnated silica gel sorbs phosphine effectively, and Ascarite appears suitable for sorbing HCN. Work on chlorine and fluorine systems is to be undertaken in the future. (Author abstract modified)

55034 **APTIC NO. 79054**

Harmon, Grady R.

MEASURING STACK GAS CONCENTRATIONS OF SULFUR COMPOUNDS IN THE WOOD PRODUCTS INDUSTRY. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 7, p 111-137. 7 refs.*

Two types of portable systems for measuring total reduced sulfur at a paper mill complex are described: the coulometric titrator and the gas chromatograph with flame photometric detector. The static spinning syringe method is used to calibrate the gas chromatograph. The dynamic permeation tube and dilution panel techniques are used to calibrate both systems. A sample collection system used with both is described. Both systems have adequate ranges to cover sources encountered in the field. The gas chromatograph gives sulfur compounds by component from direct readout while a combination of scrubbers is required for the coulometric titrator if concentrations of individual compounds are desired. Emission concentrations of gaseous sulfur compounds from several recovery furnaces were measured. Sulfur dioxide and hydrogen sulfide constitute the majority of emissions, and a reduction in liquor load usually gives a reduction in emission concentration. Either system is capable of monitoring gaseous sulfur compound emissions from pulp and paper mills within the accuracy required. Experience has shown a higher degree of reproducibility for the gas chromatograph than for the coulometric titrator for specific sulfur compounds. (Author abstract modified)

55035 **APTIC NO. 79024**

Herrebaut, L. L.

AIR FILTRATION - PRACTICAL ASPECTS OF THE PROBLEM. *(Filtration de l air - Aspect pratique du probleme). Text in French. Chauff. Vent. Cond., 50(2):7-22, March 1974.*

Methods and instruments for the analysis of suspended particulate matter are reviewed. The weight concentration of suspended matter is determined by separation of the particles on fiber filters or microporous membranes whose weight is subsequently measured. Conventional microscopy, photoelectric methods, such as photometry, spectrophotometry, and condensation nuclei counting are available for the measurement of particle concentration. Type B spectrophotometers are suitable for a maximum particle concentration of 30,000/cu cm, and they are able to detect particles with a minimum size of 0.3 micron. The Type T spectrophotometer is suitable for a maximum concentration of 2,500,000/cu cm. Sampling on membrane surfaces is more likely to distort the granulometric spectrum than are spectrophotometers.

55036 **APTIC NO. 77194**

Kadowaki, Satoshi, Ichiro Kozima, and Kazumi Koike

DETERMINATION OF MICRO AMMONIUM IN AIR. *(Taiki chu biryo anmoniumuen no teiryo). Text in Japanese. Aichi-ken Kogai Chosa Senta Shoho (Report Environ. Pollut. Res. Cent., Aichi Pref.), no. 2:29-34, 1974.*

Atmospheric ammonium salts were quantitated by three different methods (Nessler s, indophenol, and pyrindine-pyrazolone method) and their results compared. The salts were collected on a glass fiber filter at an air sucking rate of 10 to 20 l/min. The coloring sensitivity was best by the indophenol method and 50 ppb ammonium could be detected by the method. The advantage of the pyridine-pyrazolone method as that no sample concentration was necessary and sensitivity comparable to that by the indophenol method could be obtained by reducing the amount of solvent used for the sample extraction. The ammonium salt determined by Nessler s method was 1.5 to 2 times higher than that by the indophenol and pyridine-pyrazolone methods, however, when the steam distillation technique was employed as a pre-treatment for the determination by Nessler s method, the three methods gave similar analytical results for a given sample, indicating that the Nessler s method was affected by the coexisting ions. The correlation between the sulfate concentration and ammonium concentration was also determined. The correlation factor found was 2.31 which was in close agreement with the theoretical value of 2.67 when the ammonium salt was assumed to be ammonium sulfate.

55037 **APTIC NO. 76920**

Kamiya, Akio and Hiroo Mizutani

THE DETERMINATION OF VANADIUM IN AIR BY A FLAMELESS ATOMIC ABSORPTION SPECTROSCOPY. *(Fureimuresu genshi kyuko ho ni yoru taiki chu banajiumu no teiryo). Text in Japanese. Nagoya-shi Kogai Kenkyushoho (Rep. Environ. Pollut. Res. Inst., City Nagoya), no. 3:29, 1974.*

The vanadium particulate in air was quantitated by the flameless atomic absorption spectrometry. The airborne dust sample was dissolved in hydrochloric acid, and vanadium was then extracted into methyl isobutyl ketone using cupferon. Twenty microliters of the MIBK solution was injected into the atomizer. A linear calibration curve was obtained for up to 3 ppm vanadium for the 20 microliter injection. The analytical results of vanadium in the air samples collected at 6 different locations in Nagoya ranged from 0.055 to 0.135 micrograms/cu m air with an average value of 0.088 micrograms/cu m air. The detection limit of the technique was 0.05 ppm vanadium with an S/N ratio of 2. Although the technique was not rapid, it gave high sensitivity and good reproducibility for vanadium analysis in air samples. The amount of air required to analyze the vanadium was 50 cu m.

55038 **APTIC NO. 77166**

Langer, Arthur M., Anne D. Mackler, and Fred D. Pooley

ELECTRON MICROSCOPICAL INVESTIGATION OF ASBESTOS FIBERS. *Environ. Health Perspect., vol. 9:63-80, 1974. 22 refs.*

The results of electron microscopic investigations of various types of asbestos are presented. Chrysotile asbestos fibers are composed of bundles of fibrils, and the fibers are often curvilinear with splayed ends. Individual fibrils consist of a central capillary defined by an electron dense crystalline wall. With increasing time of electron bombardment, the capillary wall decreases in thickness, deforms, and is encapsulated in an electron translucent material. A well recognized sequential deformation pattern may be used for identification purposes. Amphibole fibers tend to be straight, splintery, and electron-opaque, although curved fibers are occasionally observed. Diffraction contrast figures are visible as dark bands moving parallel and at right angles to the fiber axis. Crocidolite forms the shortest and thinnest fibers, followed in size by amosite and anthophyllite. Size distribution characteristics of the amphibole fiber types are different. The selected area electron diffraction pattern for chrysotile is unique, whereas different amphibole asbestos fibers possess diffraction patterns having similar characteristics, thus prohibiting individual identification. (Author abstract modified)

55039 **APTIC NO. 77168**

McCrone, Walter C.

DETECTION AND IDENTIFICATION OF ASBESTOS BY MICROSCOPICAL DISPERSION STAINING. *Environ. Health Persec., vol. 9:57-61, 1974. 2 refs.*

Asbestos fibers as small as 1 micron diameter can be uniquely identified by light microscopy using dispersion staining methods. The technique involves the suspension of fibers in liquids of known refractive indices and observations of color display by means of a dispersion staining objective. Wavelengths or indices of refraction may be determined at right angles to and parallel to fiber axes. The method is capable of sensitivity in the ppm range. Wavelength data are provided for a number of different types of asbestos.

55040 **APTIC NO. 77079**

Miranda, Henry A., Jr., John Dulchinos, and Henry P. Miranda

BALLOON-BORNE AEROSOL COUNTER MODIFICATIONS. PARTICLE SIZING ACCURACY TESTS (FINAL REPORT). *Epsilon Labs., Inc., Bedford, Mass., Air Force Cambridge Research Labs. Contract F19628-74-C-0078, Proj. 7621-03-01, DOD Element 62101F, Subelement 687621, Rept. FR2003-74 and AFCRL-TR-74-0349, 31p., July 1974. 2 refs.*

NTIS, DDC: AD784866

Refurbishing work performed on the Air Force Cambridge Research Labs. aerosol counter and certain improvements in the signal processing circuitry and associated software, which simplify the background level determination procedure and generate useful in-flight diagnostic information, are described. The results of exploratory tests to examine the combined effects of polarized illumination and particle shape as well as index of refraction on the sizing accuracy of the counter are presented. Mild departures from sphericity together with index of refraction of up to 2.4 did not seriously affect the sizing accuracy of the aerosol counter at the small end of the size regime (less than one half micron). Particles from several types of polishing compounds were nebulized and the size distribution as measured by the aerosol counter was compared with scanning electron microscope data. (Author abstract modified)

55041 **APTIC NO. 79417**

Mizohata, Akira and Tetsuo Mamuro

MULTIELEMENT ANALYSIS OF AIRBORNE DUST BY ENERGY DISPERSIVE X-RAY FLUORESCENCE SPECTROMETRY. *(Enerugi bunsangata keiko X-sen bunsekiho ni yoru taiki fuyujin no tagenso bunseki). Text in Japanese. Radioisotopes, 23(8):35, 1974.*

A method of matrix correction which is applicable to energy dispersive X-ray fluorescence analysis of airborne dust collected on a membrane filter is described. The matrix correction could be done by use of the effective total mass absorption coefficient (mu), determined experimentally. However, in the case of a large number of specimens to be analyzed, the determination of the coefficient mu of each independent specimen is complicated and almost impossible. In the case of specimens with similar composition it is significantly practical to make the matrix correction of all specimens by taking an average of the observed values of some selected specimens. The detection limit of various elements was estimated for this method.

55042 **APTIC NO. 76919**

Mizutani, Hiroo and Akio Kamiya

DETERMINATION OF SELENIUM IN AIR BY GAS CHROMATOGRAPHY. *(Gasu kuromato gurafi ni yoru taiki chu seren no teiryo). Text in Japanese. Nagoya-shi Kogai Kenkyushoho (Rep. Environ. Pollut. Res. Inst., City Nagoya), no. 3:31, 1974.*

The determination of selenium in air is studied by gas chromatography. After the air sample was collected on a glass fiber filter by a high volume air sampler, the sample was treated with nitric acid, perchloric acid, and hydrochloric acid. An 0.5% 4-chloro-o-phenylenediamine solution was used from from the complex with Se ion which was then extracted into n-hexane for the GC injection. No effect on the Se determination was observed by the presences of 1000 times excess amount of iron (III), copper (II), manganese (II), lead (II), or silicon (IV), 200 times excesses of zinc (II), 60 times excesses of vanadium (II), or 30 times excesses of tin (II). The Se complex with 4-chloro-o-phenylenediamine was quantitatively formed in the solution of pH 1.0. The average recovery of Se by the method was 95.4% with a standard deviation of 2.91%. The GC column used was a 2-meter long column with 15% OV-17 on chromosorb W. Nitrogen gas was used as the carrier gas and was flown at a pressure of 22 kg/sq cm. The retention time of the Se complex was about 2.5 min at a column temperature of 190 C. The Se level found in the air sample was below 0.01 micrograms/cu m air. The detection limit of the method was 0.0005 micrograms Se/cu m air if a 200 cu m air sample was collected.

55043 **APTIC NO. 79348**

Mori, S., H. Tanaka, K. Ono, F. Adachi, and K. Nagami

STUDY OF MEASURING DUST CONTENT IN STACK GAS. *(Endo haigasu chu no baijinryo sokutei hobo no jikkenteki kento). Text in Japanese. Kangawa Ken Kogyo Shikenjo Kenkyu Hokoku (Bull. Ind. Res. Inst.), no. 41:25-31, 1974. 9 refs.*

Techniques of measurement of dust content in stack gas are reviewed. In order to obtain a consistent average concentration of dust in the curved stack path, special care has to be taken because of a 2 nonhomogeneous distribution of dust in the vicinity of the curved portion. Because insertion of the sample collector also induces random flow in the stack path, the geometry of the top of the sample collector has to be designed with care. The angle of the top of the nozzle of the sample collector should be smaller than 30 deg, and in the 90 deg bend stack path, the observation points should be taken at a distance of 10 times the diameter of the stack path from the corner to insure homogeneous distribution of the dust.

55044 **APTIC NO. 79209**

Nelson, J. William and Dennis L. Meinert

PROTON ELASTIC SCATTERING ANALYSIS -- A COMPLEMENT TO PROTON- INDUCED X-RAY EMISSION ANALYSIS OF AEROSOLS. *Preprint, Florida State Univ., Tallahassee, Fla., 8p., 1974. 1 ref. (Presented at the Denver X-ray Conference, Annual, 23rd, Denver, Colo., Aug. 1974.)*

Simultaneous multi-element quantitative analyses for the light elements in an aerosol sample may be made using proton scattering. Characteristics of the method and calibration are discussed. Sample size and thickness requirements are the same as those for proton induced X-ray emission analysis (PIXE). Since PIXE permits quantitative evaluation of the medium to heavy elements, the combination of these techniques comprises a means of analysis for all elements. Proton scattering analysis is nondestructive, fast, and susceptible to automation. (Author abstract modified)

55045 **APTIC NO. 76952**

Noma, M., M. Ito, R. Suzuki, A. Moritani, Y. Watanabe, T. Nakaya, N. Saito, and H. Oda

THE EFFECTS OF SULFUR OXIDES ON THE MEASUREMENTS OF DUST CONTENT IN STACK GASES. *(Endo Haigasu chu no baijin ryo sokutei kekka ni oyobosu io sankabutsu no eikyo). Text in Japanese. Aichi-ken Kogai Chosa Senta Shojo (Rept. Environ. Pollut. Res. Cent. Aichi Pref.), no. 2:51-56, 1974. 6 refs.*

Dusts were sampled by the JISZ 8808 method using borosilicated glass fibrous filter paper (Toyo 86R) and silica fibrous filter paper (Toyo 88R). The filter papers were fixed in a coupled cylindrical filter paper in series. The dust was weighed after treating the filter paper at 120 C for 2 hr. The sulfur oxides concentration in flue gas was analyzed by the neutralization method or by non-dispersive infrared analysis method, and that on the filter paper was analyzed by high frequency combustion- electrolysis after extraction and precipitation with barium chloride. Results showed that the 86R filter paper gave a larger amount of collection compared to the 88R filter paper and the increased amount was mostly sulfur oxides. The dust content of the 86R paper decreased exponentially with increasing SOx concentration. The decrease of dust reached 70% at 1000 ppm SOx. The SOx content of the 86R paper as a second filter in a series with the 88R paper as the first filter paper was directly proportional to the SOx concentration in stack gases.

No apparent effects of temperature and moisture were found on SOx adsorption on the filter paper.

55046 **APTIC NO. 79298**

Oikawa, Kikuo

ATOMIC ABSORPTION SPECTROGRAPHY. B. ATMOSPHERIC DUST. *(Genshi kyuko bunseki-b. Taiki funjin). Text in Japanese. Preprint, Japan Spectroscopical Society, p. 6-11, 1974. (Presented at the Japan Spectroscopical Society Summer Seminar, 10th, Nagano, Japan, Aug. 6-9, 1974.)*

A common sample of atmospheric dust collected on air cleaner filter used in buildings was prepared for the cross-checking of values obtained by atomic absorption spectrometry, emission spectrometry, and fluorescent X-ray spectrometry. The homogeneity of the sample was evaluated with atomic absorption by measuring concentrations of copper, zinc, lead, and manganese. The dispersion ratio obtained was found significant at the 5% level. Metallic contents in crude oil, heavy oil, and light oil were also measured by the atomic absorption method, emission spectrometry, and fluorescent X-ray spectrometry. The discrepancies in values were as high as two or three digits in the case of different measurement methods. However, the reproducibility of the value was good when the same sample and same equipment were used. Similar analyses were conducted with coal, heavy oil soot, and coal residue. Contrary to the results for heavy oil and coal, the range of measured values was extremely small for soot and residues. The discrepancy in measured values appears to be higher for organic substances than for inorganic residues.

55047 **APTIC NO. 77231**

Okabayashi, Minahiro, Tomohiko Ishiguro, Takashi Hasegawa, and Yoshihiro Shigeta

STUDIES ON THE MEASUREMENT OF LOW-MOLECULAR-WEIGHT CARBOXYLIC ACIDS IN THE ATMOSPHERE. *(Taikichu teikyu shibosan no sokuteiho no kento). Text in Japanese. Nihon Kankyo Eisei Senta Shoho (Bull. Japan. Environ. Sanit. Cent.), no. 1:58, Dec. 1974.*

The analytical technique for the determination of low-molecular- weight carboxylic acids by gas chromatography is studied. The carboxylic acids studied were acetic acid, propionic acid, iso-butyric acid, n-butyric acid, iso-valeric acid, and n-valeric acid, which were absorbed by 1% sodium hydroxide solution and freed by 10 N phosphoric acid before they were extracted into diethyl ether, and the amount of carboxylic acids in the diethyl ether was determined by GC equipped with a hydrogen flame ionization detector. The extraction efficiency of carboxylic acids was higher with increased number of carbon atoms in carboxylic acids. When 1.0 mg of acetic acid, propionic acid, iso-butyric acid, n-butyric acid, and n-valeric acid, was extracted by 25 ml diethyl ether, the extraction efficiencies obtained by the single extraction were 16.2% 46.1%, 63.0%, 80.7%, 97.2%, and 96.4% respectively. The diethyl ether phase could be concentrated by evaporating diethyl ether with bubbling nitrogen gas in order to improve the detection limit. The overall recovery of carboxylic acids was quantitative within 10% deviation. A suitable internal standard compound was examined using various hydrocarbon compounds, and the best compound was either p-xylene or m-xylene which showed its GC peak between the peaks of acetic acid and propionic acid. The method was applied to determine the carboxylic acids in the air near animal barns. From the air sample collected near a pig pen, 15 ppm propionic acid, 1 ppm iso-butyric acid, 1 ppm n-butyric acid, 1 ppm iso-valeric acid, 1 ppm n-valeric acid, and trace acetic acid could be detected. The detection limit of carboxylic acids by the method was 0.3 ppm with 10 l of air sampling; however the detection limit could be extended to the ppb level if the amount of sampled air were increased.

55048 **APTIC NO. 79435**

Okuno, Toshihide, Masahiko Tsuji, Yukizo Shintani, and Hiromu Watanabe

GAS CHROMATOGRAPHY OF CHLORINATED HYDROCARBON IN URBAN AIR. *(Toshi taikichu ni okeru ensoka tanka suiso ni kansuru gas chromatography). Text in Japanese. Kyogo-ken Kogai Kenkyusho Kenkyu Hokoku (Rept. Public Nuisance Res. Inst. Hyogo Prefect.), no. 6:1-6, 1974. 8 refs.*

A gas chromatographic procedure for measuring ppb levels of atmospheric chlorinated hydrocarbons is described. The procedure employs electron capture-flame ionization detection preceded by a sample concentrating apparatus. The latter consists of an absorption tube for carbon dioxide which is filled with soda lime, two absorption tubes for water which are filled with calcium chloride, a glass wool-phosphorus pentoxide tube, and a concentrating tube which is filled with glass beads (20-30 mesh) and cooled at -183 C with liquid oxygen. The chromatographic column consists of silicon DC-550 (5%) and Chromosorb W (60-80 mesh). The column temperature is 50 C, and the carrier gas is nitrogen. The method is demonstrated for the detection of dichloromethane, carbon tetrachloride, perchloroethylene, chloroform, trichloroethylene, and 1,1,1,2-tetrachloroethane in an urban air sample collected in Japan. Concentrations ranging from 0.01-9.4 ppb are reported.

55049 **APTIC NO. 79120**

Patton, John D. and John W. Walton

APPLYING THE HIGH VOLUME STACK SAMPLER TO MEASURE EMISSIONS FROM COTTON GINS, WOODWORKING OPERATIONS, AND FEED AND GRAIN MILLS. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 6, p. 97-109. 4 refs.*

The application of the high volume stack sampling method to measure emissions from cotton gins, feed and grain mills, and woodworking operations is discussed. It calls for the use of a heated probe and box containing a filter placed outside of the stack and followed by an impinger train. The test procedure is described, including determination of air flow rates and properties, sampling, sample recovery, analysis, calibration, and calculations. When the sampler was tested on cyclone emissions in woodworking operations, the pitot tube was used apart from the sampler because it could not be rotated to compensate for changing sampling positions when affixed to the probe. The sampler did not have any problem in collecting the material when an upset occurred in a wheat hammer mill during sampling. After testing several cotton gins air leakage in the sampler appeared, but was corrected. The high volume stack sampler can provide valid measurements of cyclone emission rates.

55050 **APTIC NO. 79039**

Petrovick, Mathew L., George S. Malindzak, Jr., Arthur A. Strong, and Robert M. Burton

THE ROLE OF PERSONAL MONITORS IN ENVIRONMENTAL AND HEALTH EFFECTS RESEARCH. *Inst. of Electrical and Electronics Engineers, New York, IEEE (Inst. Elec. Electron Engrs.), Aerosp. Electron Proc. Natl. Conf., 1974, p. 152-159. 10 refs.*

Environmental and human health effects research being conducted by the Environmental Protection Agency is reviewed along with the need for a personal monitor for measuring the effects of air pollution on community health. Currently environmental and human health effects data are collected and evaluated by techniques involving fixed monitoring stations and subject interrogation. Personal monitors are envisioned to serve as a means of providing more reliable physiologic and environmental measurements to human pollutant exposure beyond the range and capability of current community health surveillance stations. A personal monitor system ideally should record physiologic and environmental parameters simultaneously, be low in cost and portable for human subjects, and contain a solid state memory device for short-term data storage and data transfer capability. No such functional personal monitor exists in the desired configuration at present, although the technology is known. (Author abstract modified)

55051 **APTIC NO. 79119**

Pilat, Michael J.

ISOKINETIC SAMPLING WITH A STACK CASCADE IMPACTOR. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1974 (?), Chapt. 5, p. 87-96. 13 refs.*

A cascade impactor which can be inserted inside a duct or stack appears to be the most suitable device for measuring the size distributions of particles in exhaust gas streams. The design of multijet cascade impactors is described. The entire size distribution measurement procedure includes pretest preparation of the source site and analysis of the collected samples. The pretest preparation includes cleaning the impactor, placing a thin layer of high vacuum silicone grease on the impactor plates if solid particulates are to be sampled, and weighing the plates or pieces of foil placed on top of the plates. The source test cascade impactor is preheated to prevent condensation by placing it into the stack or duct with the nozzle facing downstream for approximately 15 min prior to sampling. Then a particulate sampling is obtained by facing the impactor nozzle upstream and turning on the vacuum pump. The gas sampling rate is maintained constant throughout the test. The weights of the particle collected on the plates and in the filter are used to calculate the cumulative particle size distribution. The sizes of the particles collected on the plates can be measured utilizing both optical and electron microscopy and are needed for consideration of the relationship of the stage to the particles average size. The problem of particle blow-off from the collection plates has been reduced by the use of a grease and consideration of the gas flow patterns through the impactor.

55052 **APTIC NO. 79445**

Porter, William, A., Irvin G. Burough, and Donald D. Kline

GAS ANALYZING APPARATUS. *(Commercial Electronics, Inc., Mountain View, Calif.) U. S. Pat. 3,833,305. 11p., Sept. 3, 1974. 3 refs. (Appl. Feb. 22, 1972, 21 claims).*

An apparatus for optically analyzing gas samples which include a large number of contaminants, e.g., exhaust gases, is described which avoids problems of prior art devices associated with contamination of the light source and the optical detector or windows separating them from the gas sample. The device comprises a container whose opposing walls include aligned openings forming an optical path therebetween. Means for passing the gas stream past the openings and means for positioning the light source and optical detector in the optical path on the opposite sides of the air streams are provided. The air streams prevent gas from contacting and contaminating the light source and the detector. The optical path between the light source and the detector also remains clear and uncontaminated since the openings are not closed with a transparent member such as a glass window. An air blower for positively including air flows past the openings is included in a preferred embodiment of the invention. (Author summary modified)

55053 **APTIC NO. 79537**

Pribil, Rudolf

MINERALIZATION OF PVC MICROFIBER FILTERS. *(Mineralisace analytickych mikorvlaknitych filtru z chlorovaneho PVC). Text in Czech. Hutnicke Listy (Prague), 68(10):1088-1091, Oct. 1974. 10 refs.*

Two destructive methods for mineralization (separation of organic filter material from collected aerosol particles) of PVC microfiber filters of the AFPC type were investigated. Both methods are based on the wet ashing concept of the filter material. The tests were performed in teflon containers measuring 30 ml in volume. The first method requires addition of 10 ml of concentrated sulfuric acid and heating to 200 C. A mixture of 1-2 ml of perchlorate and nitric acid (1:1) is added after 20-25 min. The second method requires addition of 15 ml of mixture of NHO_3, $HClO_4$, and H_2SO_4 in the proportions 3:2:1 by volume and heating to 150-160 C. After 25 min, when the filter is completely ashed, 1-2 ml of concentrated NHO_3 is added to complete mineralization. The duration of both procedures is 50-55 min.

55054 **APTIC NO. 79545**

Renoux, A., G. Tymen, J. F. Butor, and G. Ma[illegible]ine

UTILIZATION OF CASCADE IMPACTORS FOR THE STUDY OF THE GRANULOMETRIC DISTRIBUTION OF ATMOSPHERIC AEROSOLS. APPLICATION TO MARINE AEROSOL. *(Utilisation de cascases impactors pour l etude de la repartition granulometriques des aerosols atmospheriques. Application a l aerosol marin). Text in French. J. Rech. Atmospheriques, 8(3-4):709-721, July-Dec. 1974. 12 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

The granulometric distribution of atmospheric marine aerosols was studied using cascade impactors. Particles were studied in the size range 0.0081 micron to 100 micron using optical and electron microscopy. There are marked differences between the granulometric repartition of the continental aerosol and the marine aerosol. In the same way the coefficient B of the Junge s Law which varies according to the dimensions of the particles, varies according to whether the air is continental or maritime.

55055 **APTIC NO. 79052**

Rosen, H., P. Robrish, and O. Chamberlain

FEASIBILITY OF THE REMOTE DETECTION OF POLLUTANTS USING RESONANT RAMAN SCATTERING. *National Science Foundation, Washington, D. C., Research Applied to National Needs, Trace Contam. Conf. Proc. 2nd Annu., Pacific Grove, Calif., 1974, p. 129-132. 34 refs. (Aug. 29-31.)*

NTIS: LBL-3217

Recent measurements of large resonance Raman cross-sections for nitrogen dioxide and sulfur dioxide are examined in relation to the use of lidar for the remote detection of these pollutants. Calculations indicate that a lidar system using resonance Raman scattering can easily detect the pollutant concentrations typical of smoke plumes (greater than 10 ppm) at a range of a few hundred-meters using lasers of very modest energy. The use of resonance enhancements appears to be the only approach to workable Raman lidar system for remote smokestack monitoring in view of probable stringent eye safety standards imposed on remote instrumentation in populated areas.

55056 **APTIC NO. 77167**

Rubin, Ivan B. and Carl J. Maggiore

ELEMENTAL ANALYSIS OF ASBESTOS FIBERS BY MEANS OF ELECTRON PROBE TECHNIQUES. *Environ. Health Perspect., vol. 9:81-94, 1974. 26 refs.*

The use of electron probe microanalysis for the chemical analysis and chracterization of different types of asbestos fibers in air, water, and tissue samples is described. The technique is based on the fact that a beam of high energy 5-40 kV) electrons incident on a target specimen generates X-rays characteristic of the elements present in that specimen. If the beam of electrons is suitably focused, X-ray excitation is restricted to a relatively small volume (1 cu micron or less); and chemical analysis of small volumes is possible. The two major components in the system are the electron optical system to produce the focussed electron beam and the X-ray spectrometer which provides the means for determining the characteristics and quantity of X-rays generated in the object under analysis. Thermionic and field emission electron sources are available, while the use of X-ray spectroscopy requires the use of either wavelength-dispersive focussing crystal spectrometers or an energy-dispersive silicon (lithium) X-ray detector. Data are presented to demonstrate the feasibility of asbestos identification by using modified raw data obtained with a scanning electron microscope and energy-dispersive X-ray spectrometry. (Author abstract modified)

55057 **APTIC NO. 79215**

Shiraishi, Hideo and Jun-ichi Yamazaki

ELEMENT USED FOR ZIRCONIA OXYGEN ANALYZER. *(Sanso bunseki-kei yo jirukonia soshi). Text in Japanese. Fuji Jiho (Fuji Elec. J.), 47(7):560-564, 1974.*

An element with zirconium oxide-ytterbium oxide as a a solid electrolyte and platinum alloy as the electrode was developed for use in the analysis of oxygen in boiler waste gas. The Zirconia ceramic containing 10 mol% of Yb2O3 was molded by casting in a slurry form after it was fired at about 2000 C after drying. The ceramic tube was then coated with a platinum alloy paste and was fired at 1300 C after drying. The resulting ZrO2-Yb2O3 solid electrolyte showed a specific conductivity about ten times that of the ZrO2-CaO electrolyte. The output of the element reached the theoretical value at temperature higher than 500 C. The standard error of the output at 670 C was less than +3% for a gas containing 979 ppm methane and 5.1% O2 and less than +2% for a gas containing 1020 ppm carbon monoxide and 5.18% O2, indicating negligible effects by combustible gases.

55058 **APTIC NO. 77109**

Stafford, Edward F., Jr.

QUANTITATIVE AND STATISTICAL ANALYSIS OF CUPOLA EFFLUENT COLLECTED BY IMPACTION. *Pennsylvania State Univ., University Park, Pa., Environmental Protection Agency Grant T900011, Publ. 366-74, p. 1-140, June 1974. 86 refs.*

The purpose of this research was: to develop and evaluate a simple and inexpensive method for obtaining particle size distributions from the effluent of a gray iron cupola; and to analyze statistically the effects of varying one or more controllable variables associated with the operation of a cupola. The sampling device was a commercially available stack sampling train with a small glass fiber filter replaced by a cascade impactor and a large glass fiber filter. The impactor fractionated the small particles from the stack effluent into six subranges from 1 to 5 micron. The large filter prevented submicron particles from damaging components of the sampling train downstream from the impactor. This equipment was field tested at an industrial foundry, where eight sample runs were taken in two days. The factors for the several 2- and 3-factor analyses of the data from the production cupolas were: cupola blast rate, the particular cupola, and location in the sampling train at which particles were collected. The results from these experiments also were compared statistically to the results obtained from the same cupola sources by the Pennsylvania Department of Environmental Resources (PDER). Blast rate was a significant factor in causing the following to vary: particulate loadings, moisture content of the stack gases, emission rates, and mean stack temperatures. Particulate loadings varied significantly from cupola to cupola. There was no significant difference between the samples obtained by this method and the samples obtained by the PDER sampling method. (Author abstract modified)

55059 **APTIC NO. 77124**

Takeuchi, Norihumi, Takashi Hasegawa, Tomohiko Ishiguro, Yoshio Nagata, and Yoshihiro Shigeta

STUDIES ON SAMPLING METHODS OF ODOR MATERIALS IN ATMOSPHERE 1, STABILITY OF TRIMETHYL AMINE AND SULFUR COMPOUNDS IN SAMPLER. *(Akushu busshitsu no saishu hobo ni kansuru kenkyu, dai 1-po, torimechiru amin to iou kagobutsu no saishu yokinai ni okeru anteisei). Text in Japanese. Nihon Kankyo Eisei Senta Shobo (Bull. Japan Environ. Sanit. Cent.), no. 1:38, 1974.*

The sampling methods of odor materials are investigated including polypropylene bag, Pyrex glass syringe, Pyrex glass bottle, hard glass syringe, and hard glass bottle. The odor gases used were trimethylamine, hydrogen sulfide, methyl mercaptan, dimethyl sulfide, ethyl mercaptan, and dimethyl disulfide. These gases were filled in each sampler, and the retained gases were quantitated by gas chromatography as a function of time after the sampling. The persistence of these odorous gases was better in the glass bottles and plastic bag then in syringes. Of 500 ppb sulfur compounds in the hard glass bottle 100% was retained even at 20 hr after the sampling, but the retained amount of these gases in the hard glass syringe at 5 hr after the sampling was 80% for diethyl sulfide, 75% forr dimethyl disulfide and dimethyl sulfide, 45% for methyl mercaptan, 25% for ethyl mercaptan, and 15% for hydrogen sulfide. Of the initial 300 ppm trimethyl amine, 80% was retained in the polypropylene bag after 20 hr, but the retained amount of 300 trimethylamine was 50% in the glass syringes after 20 hr.

55060 **APTIC NO. 79031**

Thal, M. F. and P. Zettwoog

TECHNIQUE OF MEASURING ATMOSPHERIC POLLUTION DUE TO ODORS. *(Techniques de mesure de la pollution atmospherique due aux odeurs). Text in French. Bull. Inform. Sci. Tech. Commis. Energ. At. Fr., no. 191:53-60, 1974. 3 refs.*

The physiological mechanisms of odor perception, and methods for the qualitative and quantitative characterization of odors are described. For the instrumental analysis of odorous gases, sampling can be done by adsorption at -190 C, or by condensation at the same temperature. Odorous substances can be analyzed by a combination of gas chromatography and an olfactometer in which the odorous substances are characterized by an expert on the basis of their passage time from the chromatograph. Instrumental characterization of odorous substances is possible by a combination of gas chromatography and mass spectrometry. A new field olfactometer, permitting the dilution of odorous gases with odoriess air at ratios ranging from 0 to 2500 is suitable for the quantitative and qualitative characterization of odors by two experts simultaneously. The relationship between odor intensity and molecular volume, localized polarization, as well as the proton receptor and donor capacities of the molecule was established.

55061 **APTIC NO. 77235**

Torii, K., H. Koyama, and Y. Tomita

MEASUREMENTS OF SUSPENDED PARTICULATES IN ATMOSPHERE. PART 1. *(Taikichu fuyuryushijo bushitsu no sokutei ni tsuite. Dai-1-po). Text in Japanese. Aichi-ken Kogai Chosa Senta Shobo (Rep. Environ. Pollut. Res. Cent. Aichi Pref.), no. 2:39-41, 1974. 2 refs.*

The correlations between the multistage type low volume air sampler, digital dust indicator, and cyclone type low volume air sampler used for the measurement of suspended particulate concentration were investigated. For the conversion of relative concentration measured by the digital dust indicator into the weight concentration, the cyclone type and multistage type low volume air samplers were used, and conversion coefficients were obtained. The correlation coefficient, average conversion coefficient and coefficient of variation for conversion coefficient obtained were 0.808, 1.3, and 23.7 for multistage type and digital, 0.745, 1.49, and 29.5 for cyclone type and digital, and 0.908, 1.13 and 17.7 for cyclone type and multistage type, respectively.

55062 **APTIC NO. 79207**

Waite, D. A.

USE OF DEPOSITON COLLECTOR PARTICLE-SIZE DATA IN THE INVESTIGATION OF ENVIRONMENTAL EXCHANGE MECHANISMS OF PARTICULATE POLLUTANTS. *Battelle Memorial Inst., Richland, Wash., Pacific Northwest Lab., 16p., Sept. 4, 1974. 14 refs.*

NTIS: BNWL-SA-5012

A deposition collector/particle-size technique for providing information on both concentration and particle size distributions during studies of particle depositon and re-entrainment is described. The particle sizing is accomplished with the aid of a glow-discharge perturbation technique which generates particle size data that can be directly accumulated and spectrometrically analyzed with a multichannel analyzer. A precipitation/particulate deposition collection device is used in conjunction with the particle sizing technique. The collection device which is situated at ground level consists of a funnel of 25 cm diameter. A 1/2-inch thick disk of rigid dust filtering material is clamped into the top of the funnel, and a plastic bag which collects the precipitation is attached to a stem beneath the funnel. The device is inserted into a stainless steel funnel stand at the sampling location.

55063 **APTIC NO. 79032**

PAROM (Pollution Atmospherique par Residus Organiques et Mineraux) Study Group of C.E.N., Grenoble, France

METHODS OF SAMPLING AND ANALYSIS OF ATMOSPHERIC POLLUTANTS. *(Methodes de prelevements et d analyse de polluants atmospheriques). Text in French. Bull. Inform. Sci. Tech. Commis. Energ. At. (Fr.), no. 191:7-29, 1974. 6 refs.*

Existing air pollutant sampling and analytical methods developed by PAROM, Grenoble, France, are described. Gaseous pollutants are sampled most commonly by bubbling them through a reagent or absorbent solution, while organic vapors are adsorbed on a chromatographic adsorbent layer at a very low temperature. Particulate matter is sampled by filtration or by electrostatic precipitation, the latter technique permitting non-destructive sampling and granulometric separation for analysis. Certain gaseous air pollutants, such as sulfur dioxide, nitrous gases, and chlorine are determined commonly by the spectrocolorimetric method, while hydrogen fluoride and soluble chlorides are determined by means of ion-specific electrodes. For the analysis of particulate matter, the organic fraction is extracted with solvents by ultrasonic technique, after which the organic fraction is separated by thin-layer or liquid chromatography for determination by a combination of gas chromatography and mass spectrometry, while the mineral fraction is analyzed by atomic absorption or X-ray fluorescence. Organic vapors are determined most efficiently by a combination of gas chromatography and mass spectrometry. An instrument for the field measurement of gaseous fluorine by means of a ion-specific electrode at a sensitivity of 0.1 microgram/cu m, and a similar instrument for chlorine determination at 1 microgram/cu m sensitivity have been developed.

1973

55064 **APTIC NO. 77114**

Baranowski, J.

MEASUREMENTS OF DUST DENSITY AT ITS SMALL AMOUNTS BY MEANS OF AN AIR PYCNOMETER. *Air Conserv. (English translation from Polish of: Ochrona Powietrza), 7(2):13-21, 1973. 9 refs.*

NTIS: TT 73-54096/2

A pycnometer for measuring the density of dust in quantities of approximately 1.5 cu cm and its operation are described. The pycnometer was used to determine the density of metallic mercury, grinding glass, dust from an iron sintering plant, fly ash from a powerhouse, coal dust, copper oxide, and aluminum oxide. The results were compared statistically with those obtained with a larger air pycnometer, which used approximately 15 cu cm of the substances, and a liquid pycnometer. The results obtained with the smaller air pycnometer contained an allowable error when compared with results obtained with pycnometers recommended by Polish standards and technical literature.

55065 **APTIC NO. 77133**

Brocco, D., M. Possanzini, and L. Zoccolillo

DETERMINATION OF THE POLYNUCLEAR COMPOUNDS IN PARTICULATE MATTER. *(Determinazione dei composti polinucleari nel materiale particellare). Text in Italian. Ann. Ist. Super. Sanita (Rome), 9(1):409-418, 1973. 12 refs.*

A method for determining polynuclear compounds, i.e., polycyclic hydrocarbons and aza-heterocyclics, in particulate matter is reported. The procedure is based on a gas chromatographic analysis after a preliminary thin-layer chromatographic separation. The cyclohexane extract of the dust is developed with hexane-benzene (1:1) on a silica gel plate to separate the polycyclic hydrocarbons and with benzene-pyridine (4:1) to isolate the aza-heterocyclic compounds. The two classes are then examined separately by gas chromatography for identifying and evaluating the individual constituents. (Author abstract)

55066 **APTIC NO. 79053**

Cross, Frank L., Jr. and Howard F. Schiff

STATE OF THE ART FOR CONTINUOUS SOURCE MONITORING. *In: Air Pollution Control and Industrial Energy Production. Kenneth E. Noll, Wayne T. Davis, and Joseph R. Duncan (eds.), Ann Arbor, Mich., Ann Arbor Science, 1973 (?), Chapt. 8, p 139-149. 3 refs.*

Air pollution source monitoring may be categorized into monitoring of particulates, gaseous pollutants, visible emissions, and particle size. Most stack monitoring for particulates is still manual. Sampling trains using various procedures only collect a sample for a limited, integrated, period of time. The most promising commercial continuous particulate monitoring unit now on the market uses a filtration beta radiation attenuation technique. The piezoelectric mass monitor cannot handle the very high particulate loadings found in many stacks without dilution of the sample. The preferential techniques for continuous monitoring for the primary gaseous constituents are listed. Most units are prone to interferences from pollutants other than those that are being analyzed, and they are also subject to electronic instability. The majority of the continuous monitoring devices for visible emissions include photoelectric detection techniques. The major problem with detectors of this type is the considerable possibility of the coating of the lens or detector with particulates. Some detectors compensate for this decrease in light strength by a self calibration technique. Laser holography is now being used for particle sizing. Systems are available for a particle size range of 0.1 micron to 1000 micron. The range of particle velocity that can be examined by laser holography at the present time is from slow moving particles to those with velocities of 10,000 ft per sec and exposure time of 20 nanosec.

55067 **APTIC NO. 79011**

Kobayasi, Takao and Humio Inaba

LASER-RAMAN RADAR FOR THE REMOTE MEASUREMENT OF ATMOSPHERIC MOLECULAR CON-

STITUENTS. Electron. Commun. Japan, 56C(2):101-109, Feb. 1973. 31 refs.

The principles and characteristics of laser-Raman radar are discussed in relation to remote measurements of atmospheric constituents. Laser-Raman radar measurements are based on the Raman backscattering by molecular constituents in the atmosphere. The use of an ultraviolet nitrogen molecular laser for measuring Raman backscattering and the relative number density of molecules in various types of atmospheres is illustrated. Typical spectra are reproduced for nitrogen, oxygen, water, and carbon dioxide molecules in ordinary atmospheres. Spectra for sulfur dioxide, ethylene, formaldehyde, nitric oxide, hydrogen sulfide, methane, water droplets, and water vapor are illustrated for an oil-smoke plume. Examples of intensity peaks for C_2H_4, H_2CO, NO, carbon monoxide, and H_2S are given for an automobile exhaust sample. (Author abstract modified)

55068 **APTIC NO. 79433**

Mamuro, Tetsuo, Yatsuka Matsuda, and Akira Mizohata

NONDESTRUCTIVE MULTIELEMENT ANALYSES OF AIRBORNE PARTICULATES BY COMBINED USES OF INSTRUMENTAL NEUTRON ACTIVATION ANALYSIS AND ENERGY DISPERSIVE X-RAY FLUORESCENCE ANALYSIS. *Annu. Rep. Radiat. Cent. Osaka Prefect., vol. 14:1-4, 1973. 10 refs.*

The combined use of instrumental neutron activation analysis and energy dispersive X-ray fluorescence analysis for the determination of up to 45 elements in airborne particulate samples is described. The elements aluminum, chlorine, calcium, titanium, vanadium, manganese, and indium are determined by 5 min of irradiation with neutron activation analysis; while the elements sodium, potassium, scandium, chromium, iron, cobalt, nickel, zinc, arsenic, selenium, bromine, rubidum, silver, cadmium, antimony, cesium, barium, lanthanum, cerium, samarium, europium, ytterbium, lutetium, hafnium, tantalum, tungsten, gold, mercury, and thorium are determined by 1 hr irradiation with neutron activation analysis. Elements such as silicon, sulfur, copper, gallium, strontium, zirconium, niobium, molybdenum, and lead which are impossible or difficult to determine by neutron activation analysis are determined by energy dispersive X-ray fluorescence analysis.

55069 **APTIC NO. 79432**

Mizohata, Akira and Tetsuo Mamuro

ELEMENTAL ANALYSIS OF AIRBORNE DUST BY ENERGY DISPERSIVE FLUORESCENT X-RAY SPECTROMETRY (II). *Annu. Rep. Radiat. Cent. Osaka Prefect., vol. 14:19-22, 1973. 2 refs.*

The elemental analysis of airborne dust samples by energy dispersive fluorescent X-ray spectrometry is discussed, with particular emphasis on correction for matrix effects. An equation is derived for a matrix correction term, and it is shown that for thin specimens the matrix correction term can be considered as unity. A procedure for calculating the effective mass absorption coefficient of thick samples is also provided. The limits of detection of X-ray fluorescence spectrometry are tabulated for the following elements: potassium, calcium, titanium, vanadium, chromium, managanese, iron, nickel, copper, zinc, arsenic, selenium, bromine, rubidium, strontium, zirconium, molybdenum, mercury, and lead. The detection limit of the method ranges from 0.1 micrograms/sq cm for elements like Zr to 9 micrograms/sq cm for elements like potassium.

55070 **APTIC NO. 79026**

Pfeifer, H. J.

METHOD FOR THE DETECTION OF LARGE PARTICLES IN LASER ANEMOMETRY. *(Ein Verfahren zur Erkennung grosser Teilchen in der Laseranemometrie). Text in German. ISL Rep., no. 37/73, 15p., Nov. 2, 1973. 9 refs.*

NTIS: N75-0441

A method based on the Mie theory for the identification of particles larger than 0.2 micron in laser anenometry is described. Identification is possible by perpendicular and parallel polarization of the scattered light. The signals of large particles is suppressed automatically by conventional electronic circuitry if the ratio of the signal amplitudes of the perpendicularly and parallelly polarized components is smaller than 2.5.

55071 **APTIC NO. 76980**

Takahara, Hikaru

FUNDAMENTAL EXPERIMENTS ON MEASURING MICROSCOPIC PARTICLES IN THE ATMOSPHERE BY LASER. *(Reza ni yoru taikichu biryushi sokutei no koso jikken). Text in Japanese. Chiba Daigaku Kankyo Kagaku Kenkyu Hokoku (Rep. Environ. Res. Organ., Chiba Univ.), 1(1):111- 112, July 1973. 3 refs.*

Experiments in measuring microscopic particles in the atmosphere were carried out with a ruby laser. The output of the ruby laser was several kilowatt. The laser beams were detected with a photo- multiplier and a synchroscope. The wave forms of the laser beam through an optical path length of 30 cm were studied. Then, the wave forms of the laser through an optical path length of 100 cm on a clear night, as well as the wave forms through an optical path length of 30 cm intervening with the vapor from dry air were studied. Generally, the laser beam was transmitted from a ruby rod in the form of a filament. It was therefore, difficult to make a comparison between transmittance of laser beams and spikes in sending and receiving signals. When a calculation of the attenuating ratio of thee laser beam was made, it was necessary to average the attenuation in the respective spikes. At present the attenuation ratio is determined only qualitatively. The attenuation of the wave form with its intervention was significant.

55072 **APTIC NO. 79147**

Societe d Etudes et de Travaux et du CEN, Grenoble (France)

NEW FRENCH TETHERED BALLOONS OF LARGE VOLUME. USE OF TETHERED BALLOONS FOR AIR POLLUTION MEASUREMENTS. *(Nouveaux ballons captifs francais de grand volume. Emploi de ballons captifs pour mesure de la pollution de l air). Text in French. Bull. Inform. Sci. Tech., no. 186:7-24, Nov. 1973. 2 refs.*

The development of tethered balloons with volumes of up to 15,000 cu m and capable of sustaining wind speeds of over 25 m/sec is described along with their application to meteorological and air pollution measurements. The balloons are made of synthetic fabrics and use hydorgen gas for their displacement. Air pollutants are measured by the installation of analytical devices on a tethered balloon cable; and a radiosonde package is used for monitoring atmospheric pressure and temperature, water vapor, and wind velocity. Some experimental data are provided for measurements of sulfur dioxide, water vapor, hydrocarbons, and various meteorological parameters. The effect of temperature inversion on pollutant diffusion is also discussed.

1972

55073 **APTIC NO. 79029**

Bergqvist, Kjell

METHODS FOR ANALYSIS OF NITRIC OXIDE AND NITROGEN DIOXIDE IN THE ATMOSPHERE AND IN EXHAUST GASES. A LITERATURE SEARCH. *(Analysmetoder for kvavemonoxid och kvavedioxid i atmosfaren och i avgasen. En litteraturgenomgang). Text in Swedish. Research Inst. of National Defense Division 1, Sundbyberg, Sweden, Rept. FOA 1, 21p., Oct. 1972. 25 refs.*

NTIS: N75-12454

Methods available for the analysis of ambient nitric oxide and nitrogen dioxide , flue gases and automobile exhaust gases are reviewed. Despite intense research in this area, there is no perfect analytical method as yet available, with the chemiluminescent method being most suitable. The Saltzman method is used most widely either in continuous or in batch operation. The Jacobs-Hochheiser method, adopted by the EPA as a standard method for intermittent monitoring, is widely criticized because the absorption capacity for NO2 is only 35%. The Saltzman method with sampling at 30 min-intervals has been adopted and used successfully in Germany. The only continuous dry method available for the measurement of low concentrations of nitrogen oxides is the chemiluminscent method. The total nitrogen oxides content of flue gases and automobile exhaust gases is determined by the phenoldisulfonic acid standard method in batch operation. The continuous measurement of NO and NO2 in automobile exhaust is possible by non-dispersive IR spectroscopy or chemiluminescence. The gas sample to be analyzed is heated to 600 C for the quantitative conversion of NO2 to NO.

55074 **APTIC NO. 75914**

Grimmer, G. and H. Boehnke

DETERMINATION OF TOTAL CONTENT OF ALL POLYCYCLIC AROMATIC HYDROCARBONS IN DUST AND AUTOMOBILE EXHAUSTS BY CAPILLARY GAS CHROMATOGRAPHY. *Z. Anal. Chem., no. 261:310-314. 1972. 3 refs. Translated from German, 10p.*

A method for the separation and determination of various polycyclic aromatic hydrocarbons from dust samples and automobile exhaust using capillary gas chromatography is described. A gas chromatograph with a flame ionization detector is used for the analysis, and quantitative analysis of the FID signals is made by comparing the area under a particular signal with that of an added internal standard. Retention time data are tabulated for anthracene, phenanthrene, fluoranthene, pyrene, benzo(3-4)pyrene, benzo(a)fluorene, benzo(b)fluorene, benzo(c)fluorene, benzo(c)phenanthrene, benzo(ghi)fluoranthene, benzo(a)anthracene, chrysene, triphenylene, benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(e)pyrene, perylene, dibenz(a,j)anthracene, dibenz(a,h)anthracene, benzo(ghi)perylene, anthanthrene, and coronene. Data on the ratio of benzo(3-4)pyrene to other polynuclear compounds in automobile exhaust are also presented.

55075 **APTIC NO. 77112**

Moroz, William J., Victor Withstandley, and Gerald Anderson

FINAL REPORT ON DEVELOPMENT AND TESTING OF A PARTICLE COUNTING AND SIZE ANALYZING DEVICE. *Pennsylvania State Univ., University Park, Pa., Pennsylvania Coal Research Board Contract, CAES Publ. 294-73, p. 1-27, Dec. 1972.*

A device was developed that counts and determines the size of particles in the air. It is portable and suitable for use in mines. Pulses of light reflected from particles passing through a given volume in the device are counted with the aid of a photomultiplier tube. The device is described in detail. Primary calibration for size is performed by measuring pulse- heights produced by the photomultiplier tube and plotting results as a function of particle size. The device is also calibrated by comparison with other particle counters. When particle concentration exceeds 120/cu cm, the sample is diluted with a known relative amount of filtered air to avoid counting two particles as one. Field tests have been conducted at various locations. An instrument patent has been applied for, and the device is being manufactured commercially.

1971

55076 **APTIC NO. 75915**

Kaznina, N. I.

DETERMINATION OF UNSATURATED COMPOUNDS IN THE AIR BY MERCURY SALT ADDITION. *(Opredeleniye nepredel nykh soyedineniy v vozdukhe s ispol zovaniyem reaktsii prisoyedineniya soley rtuti). Gigiena i Sanit., no. 6:63-66, 1971. 6 refs. Translated from Russian, 9p.*

A method for the determination of alpha-methylstyrene, chloroprene, styrene, divinyl, vinyl acetate, methylvinylpyridine, isoprene, and acrylic and methacrylic acids based on the addition of a mercury salt solution followed by paper chromatographic analysis of the mercury derivative was developed. A 0.2% solution of mercury acetate in ethanol was the absorbent selected. Each of the above compounds differed in chromatographic separation properties. Data are tabulated for their reaction times with mercury acetate, their chromatographic separation times, and the sampling rates employed.

1969

55077 **APTIC NO. 79020**

Rendall, R. E. G.

THE DATA SHEETS ON THE CHEMICAL AND PHYSICAL PROPERTIES OF THE U.I.C.C. STANDARD REFERENCE SAMPLES. *South African Inst. for Medical Research, Johannesburg, Pneumoconiosis Research Unit, Pneumoconiosis, Proc. Intern. Conf., 3rd, 1969, p. 23-27. 12 refs.*

Data sheets on the chemical and physical properties of U.I.C.C. standard reference samples of asbestos are described. Data on standard samples are collated under the following headings: fiber length distribution, specific surface, aerodynamic characteristics and respirable fraction, X-ray diffraction patterns and electron microprobe analysis, optical properties, chemical composition (excluding trace elements), trace elements, organic constituents, effects of reagents, and miscellaneous. This information is available to all users of the U.I.C.C. samples on request and free of charge.

AIR QUALITY MEASUREMENTS

1975

55078 **APTIC NO. 79551**

Ando, T.

PRESENT SITUATION AND ITS CONTROL OF AIR POLLUTION IN OITA REGION. *(Oita chuiki ni okeru taiki osen no genkyo to taisaku). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 11(8):711-715, 1975.*

The industrial development in the Oita region is described with the location of major industries and final production scale plans. The sulfur dioxide concentration measured since 1968 showed little variation (yearly average 0.17-0.23 ppm) at Oita city and a slight decreasing tendency (0.041-0.016 ppm) at Sagaseki-cho. The conformity to the new environmental standard was in the range of 43-82% during the period of 1972 to 1974. The nitrogen oxides and oxidant concentrations have been measured since Nov. 1973 using the telemetric monitoring system. The 1974 yearly average of NOx was 0.012-0.023 ppm, which was higher than the environmental standard. As for the oxidants, the 1-hour value exceeding the standard (0.06 ppm) was recorded 557-977 times at 10 measuring stations in 1974. Descriptions of air pollution control regulations, air pollution control plans, and air pollution control procedures are also given.

55079 **APTIC NO. 79434**

Arai, Tadashi, Shigemi Takayama, Hiroki Takamura, Kiyoshi Sekine, Yoshimi Tateishi, Toru Kobayashi, and Masahiro Shyoda

SPACE AND TIME VARIATIONS OF ATMOSPHERIC CO2 IN TOKYO. *(Tokyo ni okeru taiki chu no CO2 no chiri bunpu to hendo). Text in Japanese. Chirigaku Hyoron (Geograph. Rev. Japan), 48(6):412-417, June 1975. 6 refs.*

The geographical distribution and time variation of atmospheric carbon dioxide concentrations in the vicinity of Tokyo, Japan, were measured. Daily maximum concentrations of CO2 usually exceeded 500 ppm and reached values as high as 660 ppm under calm and inversion conditions. Carbon dioxide emissions generated in the Tokyo vicinity were transported more than 100 km from the source. Minimum CO2 concentrations were observed during the summer when fuel combustion was at a minimum and plant photosynthesis was at a maximum. Maximum CO2 concentrations were observed during the winter. The annual mean CO2 concentration during the 1972-1973 period was about 350 ppm, i.e., about 25 ppm above the world average.

55080 **APTIC NO. 77128**

Arao, Kimio

SECULAR AND RECENT VARIATIONS OF ATMOSPHERIC TURBIDITY AT NAGASAKI. *Sci. Bull. Fac. Educ., Nagasaki Univ., (25):109-114, 1975. 10 refs.*

Two types of measurements of solar radiation were used to determine the change in atmospheric turbidity over different periods of time. Measurements of direct solar radiation made with a silver disc pyrheliometer in 1972 and 1973 were compared with similar measurements made in 1937 and 1938. Calculation of mean values of the turbidity coefficient, beta, for each two year period shows that the present amount of aerosols at Nagasaki is 2.3 times as large as that in 1937-1938. Both mean values were low when compared with those of other Japanese cities. The decadic turbidity coefficient, B, was evaluated by measuring solar radiation at 0.5 microns by a Volz sunphotometer from 1969 to 1973. Corrections were made for air mass, meter deflection, and differences in the distance from the earth to the sun. No marked change was observed in annual mean values of B. Nagasaki has been comparatively free from air pollution due to aerosols, because the atmospheric turbidity in other Japanese cities showed a noticeable decrease in the same years.

55081 **APTIC NO. 77179**

Galbally, I. E.

NITROGEN OXIDES (NO2 AND NOX) IN THE AIR AT ASPENDALE AND OTHER PLACES IN VICTORIA. *Clean Air, 9(1):12-15, Feb. 1975. 9 refs.*

Measurements of nitrogen dioxide and nitrogen oxides recorded for 2 yr at various places in Victoria, Australia are presented. Average concentrations vary from less than 0.1 pphm for both NO2 and NOx in background air at Mt. Buller to 1.2 pphm NOx and 4.6 pphm NOx in air over the city of Melbourne. Both dispersion calculations and observations show that up to 1.5 pphm of NO2 at Aspendale during light southwesterly wind conditions may be due to emissions from the nearby Nepean Highway. Similar contributions to the observed concentrations are expected under similar conditions at inland sites affected by nearby roads. No simple relationship is observed between the midday concentrations of NO2 and ozone at Aspendale. (Author conclusions modified)

55082 **APTIC NO. 77009**

Goldman, Mark A.

LONG TERM BASELINE ATMOSPHERIC MONITORING. *J. Chem. Educ., 52(6):365-366, June 1975. 22 refs.*

Long-term baseline atmospheric monitoring activities at the Mauna Loa Observatory in Hawaii are reviewed. The downslope air at the monitoring site is predominantly of continental origin and thus suitable for baseline atmospheric measurements. Parameters currently being monitored at the station include: carbon dioxide, carbon monoxide, ozone, solar irradiance, water vapor, sulfur dioxide, nitrogen oxides, ammonia, hydrogen sulfide, particulates, aerosol gamma activity, and various meteorological variables. The observatory is the site of the longest continuous measurements of atmospheric CO2. Variations in the CO2 concentration from 1961 through 1972 are graphically depicted.

55083 **APTIC NO. 79218**

Grennfelt, Peringe

MEASUREMENT OF OZONE IN GOTHENBURG JANUARY 1972-AUGUST 1973 AND STUDIES OF COVARIATIONS BETWEEN OZONE AND OTHER AIR POLLUTANTS. *Swedish Water and Air Pollution Research Lab., Gothenburg (Sweden), Rept. B 221, 34p., Jan. 1975. 10 refs.*

Continuous measurements of ozone were performed during the period January 1972 to August 1973 in Gothenburg, Sweden at a site about 2 km south of the downtown area. The ozone concentration did not reach 150 ppb, the level normally used to mark a photochemical smog episode. No direct effects normally associated with photochemical smog were observed, with one possible exception. Complaints were made to the Gothenburg Board of Health on May 28, 1973 suggesting that there was photochemical smog in Gothenburg on that day. The concentration of ozone on this occasion was 80 ppb at its highest. The highest 1 hr mean in 1972 was 110 ppb and in 1973, 97 ppb. High ozone peak concentrations coincided in time with increased concentrations of particle-borne sulfur, and in many instances also of soot, at sampling stations both in and outside Gothenburg. Precipitation occurring at the time of increased concentrations was found to contain high concentrations of strong acid. The results from the comparison of ozone data and meteorological and air pollution parameters suggest that the increased ozone levels in Gothenburg are a product of photochemical reactions in the plume of pollutants from remote industrial areas on the continent or the British Isles. (Author abstract modified)

55084 **APTIC NO. 79169**

Hertz, Marvin, Kirby Kyle, Anne Duke, and George Ward

A COMPUTER CONTROLLED DATA ACQUISITION AND RETRIEVAL SYSTEM FOR USE IN AIR MONITORING PROGRAMS. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 88-95, Jan. 1975. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)*

NTIS: PB 241 150

A computer controlled data acquisition and retrieval system for use in the Environmental Protection Agency's Community Health Air Monitoring Program is described. The central computing facility is located at Research Triangle Park, North Carolina and is linked with each of the remote acquisition systems via telephone communication. Minicomputers at each remote station serve as the interface between the analyzers, magnetic tape data storage, the remote field service operator, and the telecommunications network. Data are retrieved on request of the central computer system from each of the remote stations via a dial up phone line at 2-hour intervals. The central controller for the CHAMP network is a dual processor system with a full complement of input storage and display peripherals. The computerized system also includes programs for validation and calibration operations.

55085 **APTIC NO. 79125**

Hidy, G. M., B. Appel, R. J. Charlson, W. E. Clark, S. K. Friedlander, R. Giauque, S. Heisler, P. K. Mueller, R.

Ragaini, L. W. Richards, T. B. Smith, A. Waggoner, J. J. Wesolowski, K. T. Whitby, and W. White

CHARACTERIZATION OF AEROSOLS IN CALIFORNIA (ACHEX) VOLUME I SUMMARY (FINAL REPORT). *Rockwell International, Science Center, California Air Resource Board Contract 358, Rept. SC524.25FR, 43p., April 1975.*

Results from field studies of the nature of California aerosols, especially the haze identified with air pollution, are presented. The mass concentration of aerosol particles in California s air varies widely during the day and is heavily influenced by the presence of sulfates, nitrates, and non-carbonate or oganic carbon. These constituents are products of atmospheric chemical reactions involving sulfur dioxide, nitrogen oxides, and non-methane hydrocarbon vapors. Total mass aerosol concentrations of more than 450 micrograms/cu m exist in the eastern area of the Los Angeles Basin, with sulfate concentrations of 70 micrograms/cu m or more, nitrate concentrations of 240 micrograms/cu m or more, and non-carbonate carbon concentrations of more than 50 micrograms/cu m. The aerosol is characterized by a bimodal distribution, with the submicron fraction (less than 2 micron) being dominated by anthropogenic emissions and particles from atmospheric chemical reactions. Sulfates, nitrates, and organics all fall within the submicron range and are thus significant in terms of visibility degradation and respiratory disease. The aerosol growth accompanying the evolution of photochemical smog is consistently concentrated in the 0.1-1.0 micron range. The natural or quasi-natural trace gases, ammonia and water vapor, also appear to exert an important influence on photochemical aerosol evolution. (Author conclusions modified)

55086 **APTIC NO. 79407**

Matsumura, Toshiro

ON THE HYDROCARBON CONCENTRATION IN THE URBAN ATMOSPHERE. *(Toshi taikichu no tankasuiso nodo ni tsuite). Text in Japanese. Bunseki Kiki (Anal. Instr.), 13(8):465-470, Aug. 1975.*

Hydrocarbons in air at five locations in Tokyo near busy streets were analyzed from 1964 to 1973. A hydrogen flame ionization detector capable of analyzing total hydrocarbons and unsaturated hydrocarbons was used for the analysis. The unsaturated hydrocarbons were also analyzed using silver perchlorate scrubber. The one-hour average concentration of total hydrocarbons was 1.06 ppm for four years at Kasumigazeki, 1.44 ppm for three years at Itabashi, 1.38 ppm for two years at Ohara-cho, and 1.07 ppm for two years at Shinjuku. The one-hour average concentration of unsaturated hydrocarbons was 0.25 ppm at Kasumigazeki, 0.19 ppm at Itabashi, 0.23 ppm at Ohara-cho, and 0.14 ppm at Shinjuku. The highest one-hour value of total hydrocarbon was 7.8 ppm and that of unsaturated hydrocarbons was 2.8 ppm. High concentrations of both the total hydrocarbon and the unsaturated hydrocarbons were observed in winter.

55087 **APTIC NO. 79371**

Saito, H.

INVESTIGATION ON THE ENVIRONMENTAL POLLUTION CONDITION IN THE WORLD URBAN AREA. *(Sekai kakutoshi ni okeru kankyo osen jokyo chosa). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), vol. 1975:52-60, Oct. 1975.*

Environmental pollution in major cities (New York, Los Angeles, Paris and Hamburg), was investigated through the Japanese Embassy in each country. Data on sulfur oxides concentration (yearly average, measurement method, description of measurement area) and nitrogen oxides concentration (yearly average, measurement method, description of measurement area, nitrogen dioxide data) were obtained. The environmental standards for SOx and NOx and emission standards for SOx and NOx in each city were investigated. Some of the pollution data obtained are given with analysis and evaluation.

55088 **APTIC NO. 75890**

Spangler, Carl and Noel de Nevers

BENZO(A)PYRENE AND TRACE METALS IN CHARLESTON, SOUTH CAROLINA (FINAL REPORT). *Environmental Protection Agency Rept. EPA- 450/2-75-004, 57p., June 1975. 28 refs.*

NTIS: PB 243465/AS

Measurements of benzo(3-4)pyrene and trace metals in the air over Charleston, South Carolina were performed in an attempt to explain an anomalously high incidence of deaths resulting from lung cancer in the area. Trace metal and BaP levelw ere lower than the national averages, generally falling in the 0.01 to 29 percentile among American cities. The lung cancer rate in Charleston was about 50% higher than the national average. Soil samples were also taken in Charleston at sites roughly corresponding to the area in which air was sampled to test the view that atmospheric concentrations of BaP can readily be inferred from soil concentrations. The Charleston soil values of BaP were not extraordinarily high. Thus, the abnormally high death rate from lung cancer in the area does not appear to be a result of high concentrations of BaP or trace metals. (Author abstract modified)

55089 **APTIC NO. 79369**

Stix, Erika

POLLEN AND SPORE CONTENT OF THE AIR DURING AUTUMN ABOVE THE ATLANTIC OCEAN. *(Pollen- und Sporengehalt der Luft im Herbst ueber dem Atlantik). Text in German. Oecol., 18(3):235-242, 1975. 9 refs.*

Pollen and spores were collected from the air during two Atlantic voyages. The average pollen content was 29/100 cu m air, and the average spore content came to 5 times 10 to the 4th power per 100 cu m air, in the course of 32 days. Both voyages occurred in late autumn. The spore content increased with distance from the European continent on the trip from Hamburg to the Azores. Most spores were registered in the southern North Sea and the English Channel on the voyage from Hamburg to the West Indies. Special meteorological circumstances have to be considered in explaining these concentrations during the collecting period. The origin of the spores is discussed. The spores collected near the Azores were probably from Western Europe. They covered a distance of more than 1000 km. The highest concentration was nearly 2000 spores/cu m air. (Author abstract)

55090 **APTIC NO. 77152**

Sverdrup, G. M., K. T. Whitby, and W. E. Clark

CHARACTERIZATION OF CALIFORNIA AEROSOLS - II. AEROSOL SIZE DISTRIBUTION MEASUREMENTS IN THE MOJAVE DESERT. *Atmos. Environ., 9(5):483-494, May 1975. 10 refs.*

Aerosol size distribution measurements in California s Mojave desert during 1972 were made over the particle size range of 0.003-40 micron. The average total volume over a 3-hour period was 1.85 cu micron/cu cm. The low volume was probably due to rain which fell at the site prior to the sampling period. The rain did not explain, however, the low nuclei concentrations (less than 100/cu cm) which might have occurred as a result of high altitude air which was brought down to the earth s surface. The typical background desert condition measured during the sampling period exhibited a total volume of about 8-13 cu micron/ cu cm, with the amount below 1 micron being about 3-4 cu micron/ cu cm. The nuclei concentration was a few thousand. More typical aerosols were also sampled, with an incursion of well aged aerosol from the south coast basin being recorded (total volume of 43.1 cu micron/cu cm). The average nuclei concentration ranged from 47-20,000/cu cm. (Author conclusions modified)

55091 **APTIC NO. 79437**

Vanderpol, A. H., F. D. Carsey, D. S. Covert, R. J. Charlson, and A. P. Waggoner

AEROSOL CHEMICAL PARAMETERS AND AIR MASS CHARACTER IN THE ST. LOUIS REGION. *Science, 190(4214):570, Nov. 7, 1975. 5 refs.*

Aerosol chemical composition and air mass character were studied in the St. Louis region. Comparisons of the chemical character of ambient aerosols in St. Louis during the month of September 1973 with the trajectory of the air parcel before it arrived in St. Louis revealed that 63% of the air parcels arriving from the south contained sulfuric acid-ammonium bisulfate aerosols, whereas 66% of the air parcels arriving from the north contained ammonium sulfate aerosol. This finding indicates that acid aerosols predominate in maritime tropical air masses, whereas ammonium sulfate aerosol predominates in air masses of continental polar origin.

55092 **APTIC NO. 77153**

Whitby, K. T., W. E. Clark, V. A. Marple, G. M. Sverdrup, G. J. Sem, K. Willeke, B. Y. H. Liu, and D. Y. H. Pui

CHARACTERIZATION OF CALIFORNIA AEROSOLS - I. SIZE DISTRIBUTIONS OF FREEWAY AEROSOL. *Atmos. Environ., 9(5):463-482, May 1975. 12 refs.*

Continuous measurements of the particle size distribution of aerosol along the Harbor Freeway in Los Angeles were made over a particle size range of 0.003-40 micron. The direct contribution of the freeway traffic to the aerosol mixture was calculated by taking the difference between measurements when the wind was directly from the freeway and measurements when the wind was blowing toward the freeway. The monitoring rush hour traffic appeared to contribute about 17.1 cu micron/cu cm to the aerosol volume, predominantly in the particle size range below 0.15 micron. The nuclei count was between 2 million and 3 million particles/ cu cm, and the surface area of the fresh aerosol was approximately 3000 sq micron/cu cm. Particle density, calculated from the ratios of the filter-measured mass concentration to the volume concentration obtained from in situ instruments, was a function of relative humidity. The densities ranged from about 0.91 at 88% humidity to 1.89 at the lowest humidities. Air monitoring in the freeway area showed distributions of carbon monoxide and total hydrocarbons that were representative of automobile exhaust. The nitric oxide concentration was almost an order of magnitude higher than expected. (Author asbtract modified)

55093 **APTIC NO. 76935**

Environmental Agency (Japan)

ENVIRONMENTAL WHITE PAPER 1975. *(Kankyo hakusho, 50 nenban). Text in Japanese. 513p., June 1975.*

An environmental white paper prepared by the Japanese Environmental Agency for environmental pollution during 1973 is presented. Sulfur dioxide pollution has been decreasing since 1967 which was the peak year. The SO2 yearly averages of 16 typical monitoring stations in large cities and industrial areas were 0.057, 0.059, 0.063, 0.057, 0.051, 0.044, 0.038, 0.032, and 0.030 ppm from 1965 through 1973, respectively. There are 75 out of 248 cities which met the long-term environmental standard for SO2 in 1972; 151 out of 326 cities met this standard in 1973. With the enforcement of the total emission control law in 1975, more effective SO2 control will be required. Nitrogen dioxide pollution increased slightly from 1972 to 1973 according to the yearly average of 97 stations in 66 cities; the NO2 yearly averages were 0.028 ppm and 0.030 ppm in 1972 and 1973, respectively. There were 11 stations that observed increased NO2 levels from 1972, and there were 28 stations, that observed decreased NO2 levels from 1972. The remaining 58 stations reported similar levels for 1972 and 1973 (within 0.005 ppm). There were 15 major national stations for air pollution monitoring, and they collected data on SO2, nitrogen oxides, carbon monoxide, hydrocarbons, airborne dust, and meteorological conditions. The data collected by these stations was analyzed together with data from other monitoring stations established by local governments. The total financial aid provided by the national government to local governments for the air pollution control was about $2,600,000 in 1973.

55094 **APTIC NO. 77272**

Itami City (Japan), Environmental Section

INVESTIGATION OF SULFUR OXIDES BY LEAD DIOXIDE METHOD. *(Nisankaen ho ni yoru iou sankabutsu no chosa). Text in Japanese. Kogai Chosaka Hokoku Kokushu (Coll. Rep. Pollut. Invest. Dept.), no. 1:67-79, Jan. 1975.*

Results of monitoring sulfur oxides by the lead dioxide method during 1972 and 1973 in Itami City, Japan, are summarized. From 12 to 17 monitoring locations were involved. Concentrations of sulfur oxides were determined for the four seasons of each year. Numerical results are influenced by the cumulative effects of meteorological conditions during the 30-day measuring periods, but the patterns are valid. Concentration measurements are given in units of mg sulfur trioxide/day/100 sq cm PbO2. Average yearly values decreased from 0.51 in 1972 to 0.38 in 1973. Decreases were present in all four seasons: spring, 0.56 to 0.37; summer, 0.53 to 0.50; autumn, 0.40 to 0.35; winter, 0.52 to 0.33. The maximum SO3 concentration for 1972 was 0.80; the minimum was 0.23. In 1973, the maximum was 0.79; the minimum was 0.11. During 1972, 23 major industries in the area used more than 102,000 tons of fuel (87% of total fuel usage in Itami City) and emitted nearly 750,000 N cu m of sulfur oxides (converted to sulfur dioxide). In 1972, the maximum amount of total hourly emissions of sulfur oxides from these industries was nearly 282 N cu m.

55095 **APTIC NO. 79343**

Kumamoto Prefectural Government (Japan)

PRESENT SITUATION AND CONTROL OF AIR POLLUTION. *(Taiki osen no genjo to taisaku). Text in Japanese. In: Environmental White Paper in 1974, p. 11-32, June 1975.*

In Kumamoto prefecture, sulfur oxides and suspended particulates are two major air pollutants, and pollution problems by hydrogen fluoride and hydrogen chloride are observed locally. The SOx concentration and suspended particulates measured since 1964 showed a generally decreasing trend after 1970. Data on SOx concentration measured in Arao, Yashiro, Minamata, Kumamoto and Uto cities are compiled and analyzed. The yearly average SOx concentrations(ppm) for 1972 and 1973 were 0.020-0.027 in Arao, 0.017-0.019 in Yashiro, 0.014-0.021 in Minamata and 0.021-0.026 in Kumamoto. Suspended particulate concentrations (yearly average of 1972 and 1973) were 0.025-0.059 in Arao, 0.025-0.056 in Kumamoto, 0.046-0.081 in Yashiro and 0.047-0.081 in Minamata. Amounts of sedimented dust (ton/sq km/month) measured in 1973 were 5.55 in Arao, 4.8 in Kumamoto, 5.62 in Yashiro and 5.84 in Minamata. In Arao city, the HF concentration was measured by the ion electrode method, and the yearly average HF concentration was 0.18-0.24 ppb.

1974

55096 **APTIC NO. 79010**

Ackerman, M., J. C. Fontanella, D. Frimout, A. Girard, N. Louisnard, and C. Muller

STRATOSPHERIC CONSTITUENTS (FINAL REPORT). *Institut D Aeronomie Spatiale De Belgique, Bruxelles (Belgium), Office of Naval Research Contract N00014-73-C-0076, Program Element DOT-AS-20023, NR 211-166, 25p., Nov. 1, 1974. 28 refs.*

NTIS, DDC: AD A001559

Simultaneous measurements of nitric oxide and nitrogen dioxide concentrations in the stratosphere were made with infrared absorption spectrometers mounted on balloon gondolas using the sun as a source in the 5.2 micron band of NO and the 6.2 micron band of NO2. A nitrogen oxide peak was observed at 26 km where it was equal to 4.2 + or - 1 times 10 to the 9/cu cm. The volume mixing ratio of NOx varied from 1.3 times 10 to the -9 at 20 km to 1.3 times 10 to the -8 at 34 km. (Author abstract modified)

55097 **APTIC NO. 79051**

Braman, R. S. and D. L. Johnson

AMBIENT FORMS OF MERCURY IN AIR. *National Science Foundation, Washington, D. C., Research Applied to National Needs, Trace Contam. Conf. Proc. 2nd Annu., Pacific Grove, Calif., 1974, p. 75-78. 5 refs. (Aug. 29-31.)*

NTIS: LBL-32'7

A sequential specific absorption tube system was used to selectively sample different forms of indoor and outdoor mercury in the Tampa Bay area, including the Sargasso Sea surroundings. Elemental mercury was the chief chemical form of mercury found, though mercuric chloride, methylmercury, dimethylmercury, and particulate mercury were also identified. The sampling system in combination with emission detection allowed for the analysis of these chemical forms above the 0.3 ng/cu m level. (Author abstract modified)

55098 **APTIC NO. 79217**

Brosset, Cyrill, Kenth Adreasson, and Martin Ferm

THE NATURE AND POSSIBLE ORIGIN OF ACID PARTICLES OBSERVED AT THE SWEDISH WEST COAST. *Swedish Water and Air Pollution Research Lab., Gothenburg (Sweden), Rept. B 189, 61p., July 1974. 9 refs.*

The particle content of hydrogen ion, ammonium ion, and sulfate was measured on the Swedish west coast. The investigation was carried out by phase analysis, determination of particle volume distribution, and trajectory estimates of air masses. The results indicate the occurrence of two types of acid particles. The ratio of hydrogen ion to sulfate ion concentration is low for the first type. The hydrogen ion may here by related to acid phases which have evidently been generated by catalytic oxidation of sulfur dioxide absorbed in the water droplets around the particles. Regarding the second type, the ratio of hydrogen ion to sulfate ion concentration is sometimes close to unity. The particles are very small and may have been formed in an atmosphere with a low concentration of ammonia by photochemical SO2 oxidation in the presence of nitrogen dioxide. The mean value of the particle-borne hydrogen ion concentration around the sampling site was 8 nmol/cu m during the 6 mo period from March 1st to August 31. The maximum 6 hr mean value of the concentration was about 215 nmol/cu m. (Author abstract modified)

55099 **APTIC NO. 79345**

Buat-Menard, Patrick, Jacques Morelli, and Roger Chesselet

WATER-SOLUBLE ELEMENTS IN ATMOSPHERIC PARTICULATE MATTER OVER TROPICAL AND EQUATORIAL ATLANTIC. *J. Rech. Atmospheriques, 8(3-4):661-673, July-Dec. 1974. 29 refs. (Presented at the International Symposium on the Chemistry of Sea-air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Samples of water soluble atmospheric particulate matter collected over the tropical Atlantic were analyzed for sodium, magnesium, potassium, and calcium by atomic absorption and for chlorine and sulfur as sulfate by colorimetry. Data show a strong geographical dependance of K and Ca enrichments relative to their elemental ratio to Na in sea water. Calcium enrichment is related to the presence of identified soluble calcium minerals in continental dust originating from African deserts. This dust does not influence amounts of K in the water soluble phase. Strong K enrichment appears closely associated with high concentrations of surface active organic material in the microlayer derived from high biological activity in the Gulf of Guinea. Sulfate enrichment could also be controlled by the same source. This SO4 enrichment balances the observed Cl loss in aerosols accordingly with gaseous hydrogen chloride formation processes in the marine atmosphere. (Author abstract)

55100 **APTIC NO. 79144**

Edinger, J. G.

PRELIMINARY ANALYSIS OF LARPP DATA. *Preprint, 40p., 1974 (?). 1 ref.*

A preliminary analysis of air monitoring and meteorological data obtained from the Los Angeles Reactive Pollutant Program (LARPP) is presented. Topics covered include: modifications of tracked air parcels; carbon monoxide and ozone distributions; temperature histories; and vertical profiles of temperature, dewpoint, and ozone. The LARPP data reveal that air parcels were successfully tracked and monitored for periods of several hours. Carbon monoxide concentrations for parcels decreased as the parcel volume increased due to convective deepening during the day. Observed ozone concentrations increased during the day despite the fact the volume of the parcel was increasing at the same time, suggesting that the photochemical formation rate was great enough to reverse the effects of dilution. Also favoring the increase in ozone concentration during the day was the fact that often the entrainment of inversion air from above contaminated rather than diluted the parcel due to higher ozone concentrations in the inversion.

55101 **APTIC NO. 79339**

Fitzgerald, William F. and Carlton D. Hunt

DISTRIBUTION OF MERCURY IN THE SURFACE MICROLAYER AND IN SUBSURFACE WATERS OF THE NORTHWEST ATLANTIC OCEAN. *J. Rech. Atmospheriques, 8(3-4):629-637, July-Dec. 1974. 21 refs. (Presented at the International Symposium on the Chemistry of Sea-air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Samples of the surface microlayer and subsurface sea water were collected for mercury studies at eight stations between Bermuda and Narragansett, Rhode Island. The microlayer samples were obtained using the screen technique, and all collections were made from rubber work boats away from the influence of the ship. Analyses for both reactive Hg and total Hg were carried out. The measurements were made using a gas phase detection system after preconcentration of Hg on a glass column immersed in liquid nitrogen. The concentrations of Hg in the western Sargasso Sea were small, about 10 ng per l, and rather uniformly distributed. The Hg concentrations increase in coastal regions where 122 ng per l total Hg was found at a continental shelf station. No fractionation of Hg was apparent between the subsurface water and the surface microlayer. Significant quantities of organically associated Hg were not present in the surface waters of the open ocean. More than 50% of the total Hg in coastal waters may be organically associated. (Author abstract)

55102 **APTIC NO. 76929**

Hashiguchi, T., H. Matsumoto, T. Kumamoto, S. Matsumoto, and N. Izumo

INVESTIGATION OF DUST FALL AMOUNT IN KAGOSHIMA PREFECTURE. *(Kagoshima-ken, (Izumichi, Kamiyakucho) ni okeru koka baijin ryo chosa ni tsuite). Text in Japanese. Kagoshima-ken Kogai Eisei Kenkyusho-Ho (Rep. Kagoshima Prefect. Inst. Pollut. Pub. Health), vol. 1974:110-119, Aug. 1974.*

The analysis of sedimented dust made at Izumi city and Kamiyaku of Kagoshima Prefecture from April 1973 to March 1974 is summarized. A deposit gauge and a dust jar were used to collect the sedimented dust at Izumi city and Kamiyaku respectively, and the dust was collected for 1 mo continuously before the analyses for dust accumulation, pH, water soluble component weight, and water insoluble component weight. The average dust amount of 12 months for 6 locations in Izumi City was 5.58 tons/sq km/30 days with a maximum average monthly value of 7.08 tons/sq km/30 days at one location. The pH ranged from 7.4 to 5.0 at Izumi city, while that at Kamiyaku tended to be more acidic. The water soluble component was higher in Kamiyaku with a strong wind, indicating the effect of ocean mist. The highest percentage of water soluble component in the sedimented dust was 93.18% in Kamiyaku, while that in Izumi city was 72.54%.

55103 **APTIC NO. 77057**

Hayakawa, Morihiko

HYDROGEN CYANIDE CONCENTRATION AS SUBSTANCE RELATED TO PHOTOCHEMICAL SMOG. *(Kogakaku smoggu kanren busshitsu toshite no shianka suiso nodo). Text in Japanese. Preprint, the Chemical Society of Japan, 1p., Oct. 1974. (Presented at the Chemical Society of Japan, Fall Meeting, 31st, Sendai, Japan, Oct. 2-5, 1974.)*

Hydrogen cyanide concentrations in a residential area, a chemical industrial area, and a traffic intersection in Nagoya city were measured during April 1974 - August 1974. Air (50-300 l) was sampled at a 1 l/min, and HCN was collected in a gas-absorbing bottle containing 5 ml of 1 N sodium hydroxide. It was then analyzed by the pyridine-pyrazolone method. The average HCN concentrations in the residential area, chemical industrial area, and at the traffic intersection were 0.34 ppb, 2.0 ppb, and 0.63 ppb, respectively. The correlation coefficient of HCN and oxidants was found to be 0.52, while that of HCN and SO2 was 0.78.

55104 **APTIC NO. 79326**

Hoang, Chi-Trach and Jean Servant

EXAMPLE FOR THE CONTINENTAL ORIGIN OF CERTAIN METALS IN AEROSOL OVER THE NORTH ATLANTIC OCEAN AT 40 N LATITUDE. *(Exemple d un apport continental de quelques metaux dans l aerosol au-dessus de l Atlantique Nord a la latidude de 40 deg N). Text in French. J. Rech. Atmospheriques, 8(3-4):791-805, July-Dec. 1974. 14 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Quantities of aluminum, chromium, manganese, iron, cobalt, and zinc in atmospheric aerosols over the North Atlantic Ocean between Newfoundland and the Portugese Coast were analyzed by instrumental neutron activation. Concentration ratios for different elements with Fe were determined, particularly for smoke and paint, in order to assess an indicator for possible contamination by the ship. The Zn/Fe ratio is an adequate index for local pollution, specially for smoke. Radon-222 concentration in air was calculated from the activity of its short lived decay daughter products. Comparison of daily variations of elemental concentrations and radon activities was made. A case of correlation was found between a sharp increase of radon activities and elements in atmospheric aerosols. The arrival of a continental air puff 700 mi offshore corresponded to a tenfold increase of the mean concentration of the elements in less than 24 hr. This was followed by a slower decrease down to the mean value.

55105 **APTIC NO. 77117**

Kadowaki, Satoshi, Ichiro Kojima, and Kuzumi Koike

STUDIES OF THE SIZE OF PARTICULATES IN URBAN AIR (3) PARTICLE SIZE DISTRIBUTIONS OF AMMONIUM SALTS, NITRATES, AND SULFATES. *(Toshitaikichu ryushijo busshitsu no ryudoteki kenkyu (daisanho) toshitaikichu no anmoniumu, shosanen oyobi ryusanen no ryudo bunpu). Text in Japanese. Preprint, Chemical Society of Japan, 1p., Oct. 1974. (Presented at the Chemical Society of Japan, Fall Meeting, 31st, Sendai, Japan, Oct. 2-5, 1974.)*

An Andersen sampler was used to collect samples at the Aichi Pollution Center, and the chemical composition and particle size distribution were studied. About 200 cu m of air was sampled and the collected particulates were washed and concentrated to 25-100 ml. Ammonium salt content was determined by the pyridine-pyrazolone method, nitrate content by the 2,4-xylenol method, and sulfate by the 2-aminopyrimidine method. There were two major groups of particles, with peaks at particle sizes of 0.4-0.6 micron and of 3.0-4.0 micron. The major components of the first group were ammonium salt and sulfate, while those of the second group were nitrate and aerosol. Ammonium sulfate existed as a single component in the air. The particle distributions of nitrate and aerosol in summer were different from those in winter.

55106 **APTIC NO. 77122**

Katou, Tatsuo

DETERMINATION OF THE METHANE CONCENTRATION IN THE ATMOSPHERE. *(Taikichu metan no simitsu bunseki). Text in Japanese. Yokohama Kokuritsu Daigaku Kankyo Kagaku Kenkyu Senta Kiyo (Bull. Inst. Environ. Sci. Technol., Yokohama Natl., Univ., 1(1):1-4, 1974.*

The atmospheric methane level was studied by collecting air sample into an 80 ml vacuumed bottle from which the sample is adsorbed on an activated alumina column by liquid oxygen. The collected methane on the activated alumina was analyzed by gas chromatography equipped with a molecular sieve 13X column and a flame ionization detector. Amounts of air sample greater than 80 ml gave poor separation between methane and oxygen on the chromatogram, while amounts less than 80 ml resulted in poor sensitivity. With 80 ml of air sampling, the determination error was + or - 2% for the ppm level of methane. Air samples at various locations throughout northern Japan were collected. The atmospheric methane level reached 2.0 ppm in urban and industrial areas, while that in suburbs was 1.28 ppm which could be considered as the natural balanced methane level.

55107 **APTIC NO. 79333**

Koehler, A.

AIR POLLUTION IN THE FEDERAL REPUBLIC OF GERMANY IN THE YEARS 1967-1972. *(Ueber die Luftverunreinigung in der Bundesrepublik Deutschland in den Jahren 1967-1972). Text in German. Deutsche Forschungsgemeinschaft, Bonn-Bad-Godesberg, West Germany, Kommission zur Erforschung der Luftverunreinigung, Mitteilung XV, 36p., Oct. 1974. 4 refs.*

The yearly means, frequency distribution, yearly variations, and time series of carbon dioxide, total sulfur, nitrogen dioxide and suspended particulate matter were calculated from systematic measurements conducted at 5 air pollution monitoring stations covering the territory of West Germany during the 1967-1972 period. All pollutant concentrations increased in the mountainous, rural, and urban stations, as determined from yearly means. The yearly mean concentrations exceeded the background level measured at very remote baseline stations by a factor 2 for mountainous stations, a factor 4 for rural stations, and a factor 10-20 for urban stations. The pollutant concentrations showed a declining trend in the urban stations, and a rising trend at mountainous stations. Unlike CO2, all other pollutants showed a distinct anthropogenic influence in their yearly variations.

55108 **APTIC NO. 79340**

Koske, Peter H.

SURFACE STRUCTURE OF AQUEOUS SALT SOLUTIONS AND ION FRACTIONATION. *J. Rech. Atmospheriques, 8(3-4):623-628, July-Dec. 1974. 8 refs. (Presented at the International Symposium on the Chemistry of Sea-air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Experiments with radioactive tracers were used to study the concentration ratios of sodium and barium in the surface layer of seawater. Two different seawater samples were used, a fairly clean one from the North Atlantic Ocean and a more polluted near shore sample from the North Sea. The results of the experiments indicate the presence of organic material in the surface layer at least of the near shore sample which preferentially adsorbs the barium in solution. The mechanism of this process probably is based upon selective counterion attraction by negatively charged hydrophilic groups of the organic compounds because of the stronger electrostatic potential around the bivalent Ba cation. (Author abstract)

55109 **APTIC NO. 77105**

Matter, L. and W. Schneider

ARSENIC CONTENT IN SEDIMENT DUSTS FROM ATMOSPHERIC AIR. *(Arsengehalt in sedimentierenden Staeuben aus atmosphaerischer Luft). Text in German. Lebensmittelchemie und Gerichtl. Chem., 28(8):231-240, 1974. 9 refs.*

Atmospheric settling dust and precipitation samples were collected by Bergerhoff samplers at 276 sites during a March-May period for the photometric determination of the arsenic content in settling dust. Some 23% of all readings obtained for dust samples collected during the March-April period were below 0.1 mg As/sq m/day, and this percentage was slightly over 50% during the April-May period. Values exceeding 0.65 mg/sq m day accounted for 2 to 3% of all readings. Single-skew distribution of the arsenic concentrations was established, and the concentrations were found to be influenced by meteorological factors, as most arsenic originated from industrial activities. The findings indicate the potentiality of contamination of fruit and other produce with arsenic, resulting in concentrations greatly exceeding the natural level of 0.1 ppm.

55110 **APTIC NO. 79057**

Miyamaru, Mitiko and F. W. Lima

APPLICATION OF ACTIVATION ANALYSIS FOR THE DETERMINATION OF AIR POLLUTANTS. *(Aplicacao do metodo de analise por ativacao a determinacao de poluentes atmosfericos). Text in Portugese. Inst. de Energia Atomica, Sao Paulo (Brazil), 12p., Feb. 1974. 12 refs.*

NTIS: IEA No. 326

Thermal neutron activation was used quantitatively to analyze the elements mercury, bromine, arsenic, antimony, and selenium present in the atmosphere at the campus of the University of Sao Paulo. The elements were collected in millipore filters by suctioning about 40 cu m of air through the filter. Chemical separation was achieved by distillation of bromine and bromides of the other four elements, which were retained individually in anion exchanger resins. Arsenic and selenium were collected in the same resin column. Zinc, sodium, scandium, iron, copper, samarium, lanthanum, potassium, tungsten, and chromium were qualitatively identified in the residue of the distillation: Concentrations for each were below maximum permissible levels. Gold and uranium were also identified in the various samples analyzed. (Author abstract)

55111 **APTIC NO. 79300**

Nakazawa, Y., H. Kurida, I. Hirosawa, T. Sato, R. Satsuma, H. Uchida, and M. Maruyama

SURVEY AND RESEARCH REPORT INVESTIGATION OF SULFUR OXIDES BY THE LEAD DIOXIDE METHOD AND THE ALKALI FILTER PAPER METHOD. *(Nisanka namari ho, arukari roshi ho ni yoru io sankabutsu chosa). Text in Japanese. Nagano-ken Eisei Kogai Kenkyusho Chosa Kenkyu Hokoku (Bull. Nagano Prefect. Inst. Public Health Public Nuisance), no. 121, 63p., Oct. 1974, 11 refs.*

Sulfur oxides in the ambient air in Nagano Prefecture, Japan, were measured by the lead peroxide candle method (1970-1973), and by the alkali filter paper method (1970-1972). Lead dioxide cylinders and alkali filter papers were exposed to the atmosphere for one month, then analyzed for sulfate ions by the barium chromate method. Twelve to 36 monitoring locations were selected which had good ventilation and were not too close to major localized pollution sources. Monitoring was effected 2 m above ground level. Sulfur oxides concentration measured over a 3 yr period by the lead peroxide candle method, in urban areas and near the Showa Denko factory, ranged from 0.3-0.5 mg SO3/day/ 100 sq cm PbO2 (abbreviated mg hereafter). These values, although high, are still lower than those observed in other prefectures. Non-urban and agricultural areas showed SO3 readings ranging from 0.05 mg (lowest) to 0.1 mg (average) at 6 locations. For three years (1971-1973), monthly averages showed maximum SO3 values from January to March (about 0.6 mg, every year), and minimum SO3 values in July and August (about 0.04 mg every year).

55112 **APTIC NO. 79469**

Roenicke, G. and D. Klockow

BACKGROUND LEVEL OF THE SULPHUR CONCENTRATION IN AIR IN THE FEDERAL REPUBLIC OF GERMANY 1967-1972. *(Der Grundpegel der Schwefelkonzentration der Luft in der Bundesrepublik Deutschland 1967-1972). Text in German. Deutsche Forschungsgemeinschaft Bonn-Bad-Godesberg, Federal Republic of Germany, Kommission Zur Erforschung der Luftverunreinigung, Mitteilung XII, [illegible]p Oct. 1974. 9 refs.*

The background concentration of total sulfur and sulfur dioxide were measured in the atmosphere in areas with different pollution levels in West Germany during the 1967-1972 period. Total sulfur was determined by Wickbold's method, while the West-Gaeke method was used for SO2 measurement in 24-hour samples. The total sulfur concentration was below 10 micron/cu m on non-polluted mountains, between 10 and 20 microgram/cu m in areas with medium pollution level, and around 80 microgram/cu m in highly polluted industrial and urban areas. The sulfur concentrations have shown a decrease of 30% since the beginning of the measurements, which may be due to mild winter and pollution control measures. Maxima occurred in winter due to space heating, and lower summer maxima were due to industrial emissions in polluted areas. The maxima occurred in December and January in polluted areas, and in February-March in the non-polluted areas, which is indicative of transport phenomena. Synchronism was observed in the course of the SO2 concentrations and the precipitation Ph values. The sulfur concentrations measured during the winter periods were a function of the temperature.

55113 **APTIC NO. 79528**

Roer ke, G.

RESULTS OF SULFUR DIOXIDE MEASUREMENTS IN THE GERMAN MONITORING NETWORK. *(Ergebnisse der SO2-Messungen im deutschen Messstellennetz). Text in German. Praxis. Pneumol., no. 28(814-817), 1974.*

Results of systematic sulfur dioxide concentration measurements in the national air quality monitoring network in West Germany during the 1967-1973 period are presented. While the average SO2 concentration has decreased by 20 to 40% in areas with high pollution level, an increase by a factor 2 to 3 was observed in areas with average pollution load. A slight increase was stated for mountainous areas with very low pollution levels. The SO2 concentrations were highest in December and January, except for the areas with the lowest pollution level, where the SO2 concentration peaked in February and March due to accumulation from surrounding areas. A distinct relationship was established between the SO2 concentrations and the temperature in the winter period in areas with the lowest SO2 concentration only. The SO2 emitted from combustion processes readily combined with water vapor, thus forming condensation nuclei, after which it was eliminated from the air by rain-out, wash-out, or by adsorption on surfaces. The precipitation pH in areas with the lowest SO2 concentration has already reached values around pH 4, which indicates that the pH value of the original aerosol must be even lower.

55114 **APTIC NO. 79400**

Rolla, A. and A. Girelli

AIR POLLUTION IN THE CITY OF MILAN. RESULTS OF MEASUREMENTS CONDUCTED DURING THE 1971-1972, 1972-1973, AND 1973-1974 PERIODS. *(L inquinamento dell aria nella citta di Milano. Risultati dei rilevamenti nelle stagioni 1971-1972, 1972-1973 e 1973-1974). Text in Italian. Riv. combust., 28(11-12):409-419, Nov.-Dec. 1974. 8 refs.*

Sulfur oxides and suspended solids were measured in the air of Milan during the winter heating season in 1971-72, 1972-1973, and 1973-1974. Average pollution levels in five air sampling stations and trends in the general state of air pollution are interpreted as related to emission concentrations in the different areas of the city, taking into account the advancing of the practical application of restrictions on the use of high sulfur residual oils for commercial and domestic heating. Data on the effect of a private traffic ban on Sunday during the 1973-74 winter season on the level of sulfur oxides, suspended solids, and metals are also reported. (Author abstract)

55115 **APTIC NO. 76975**

Sato, K., K. Koike, I. Kojima, H. Yoshida, S. Shibata, K. Nakamura, and K. Nakajima

ON THE HIGH CONCENTRATION OF SOX AT A LOCALIZED AREA. *(Iou sankabutsu no kyokuchiteki konodo ni tsuite). Text in Japanese. Aichi-ken Kogai Chosa Senta Shoho (Rept. Environ. Pollut. Res. Cent.), Aichi Prefect., no. 2:21, 1974.*

The trend of sulfur oxides air pollution in the Ichinomiya area is described based on the areal SOx data collected by the lead dioxide method from 1966 through 1973. The characteristic of Ichinomiya s SOx pollution is that higher SOx pollution occurs more frequently than in other surrounding areas and tends to be localized, and the SOx pollution level has been increasing every year while most of the areas in the Aichi prefecture have shown a decrease every year. The higher SOx levels occur frequently in the months of May through July. The number of days with the daily mean value of sulfur dioxide level above 0.05 ppm was 11, 10, and 19 in May, June, and July 1973, respectively. The day s peak SO2 level occurred between 9 am to 10 am throughout the year and the deviation of the time of peak appearance of SO2 was larger in the spring and smaller in winter. The chances of high SOx levels were greater with the northerly or westerly wind of velocity less than 3 m/sec; however they were smaller with the wind velocity between 0 to 0.9 m/sec than that between 1.0 to 1.9 m/sec.

55116 **APTIC NO. 79470**

Stix, E. and M. L. Ferretti

BACKGROUND LEVELS OF POLLEN AND SPORE CONCENTRATIONS IN AIR IN THE FEDERAL REPUBLIC OF GERMANY 1967-1970. *(Grundwerte des Pollen- und Sporengehaltes der Luft in der Bundesrepublik Deutschland 1967-1970). Text in German. Deutsche Forschungsgemeinschaft, Bonn-BadGodesberg, West Germany, Kommission zur Erforschung der Luftverunreinigung, Mitteilung XI, 57p., Oct. 1974. 9 refs.*

The background levels of pollen and spore concentration were studied at 8 sampling stations covering the entire territory of West Germany during the 1967-1970 period. The spore and pollen background concentrations found at different sampling stations are fairly similar. The pollen and spore counts in the air were lowest in the coastal regions, higher in high mountains, and highest in lower mountains. The pollens of grass, birch, oak, pine, and nettle were most common at all stations. While grass pollens were detected during several months during the vegetation period, pollens of tree species were present for a rather short period only. The spore concentrations were consistently higher than the pollen counts at all stations. Conidia and Cladosporium spores were most common. The spore counts were highest in late July or early August.

55117 **APTIC NO. 79341**

Van Grieken, Rene E., Thomas B. Johansson, and John W. Winchester

TRACE METAL FRACTIONATION EFFECTS BETWEEN SEA WATER AND AEROSOLS FROM BUBBLE BURSTING. *J. Rech. Atmospheriques, 8(3-4):611-621, July-Dec. 1974. 11 refs. (Presented at the International Symposium on the Chemistry of Sea-air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Laboratory experiments were performed using radioactive tracers of zinc, selenium, sodium, cesium, and europium added to natural sea water to determine differences in elemental composition between sea water and aerosol droplets as a function of particle size. The experiments were conducted using a flow of air as a stream of bubbles rising and bursting at the surface of a vessel containing sea water with added radioactive tracers at pH 8. The resultant aerosol cloud was drawn through a cascade impactor which separated particle size fractions for analysis. The sea water was obtained at a beach a few hr before use. Two or more sequential samplings, usually 12 to 24 hr in duration, were made. Enrichments relative to Na in general vary systematically with particle size and may exceed a factor of 10 but appear to depend on the particular conditions of each experiment, such as the rise distance of the bubbles and the equilibration time between the added tracers and natural constituents in sea water. Fractionation effects, often quite large, are the rule rather than the exception. Consequently, efficient transfer of pollutants from water to air is a distinct possibility. It is unwise to assume the composition of the marine aerosol, even as a first approximation, to be the same as sea water, in the absence of data. (Author abstract)

55118 **APTIC NO. 79041**

Zawisza, Edward

ANALYSIS OF POLLEN AEROALLERGEN IN WARSAW S ATMOSPHERE. *(Analiza aeroalergenu pylkowego w atmosferze Warszawy). Text in Polish. Otolaryngol. Polska (Warsaw), 28(1):9-16, 1974. 14 refs.*

Qualitative and quantitative investigations of pollen aeroallergens were conducted in Warsaw during 1971 and 1972. A characteristic four-wave inflow of pollen into the Warsaw atmosphere was demonstrated. The 8-month pollen season for Warsaw was divided into four periods (early spring, late spring, summer, and autumn); and different pollen species responsible for disease were characterized for each period.

55119 **APTIC NO. 76923**

Miyagi Prefectural Government (Japan)

MIYAGI PREFECTURE POLLUTION INVESTIGATION DATA, NO. 10, CHAPTER 2: AIR POLLUTION. *(Miyagi-ken Kogai Shiryo, dai-2-sho, taiki osen)., p. 7-198, Jan. 1974.*

Data on environmental and weather observations in the Miyagi Prefecture, automobile emission concentrations health investigations of residents, health examinations for schoolchildren, investigations on fuel regulations and their enforcement, and investigations of combustion gas emissions from principal factories are presented. General air monitoring for settling particulates and sulfur oxide measurements is conducted at 34 locations in the prefecture. The annual average for settling particles ranged between 2.72 to 7.21 tons/sq km/mo, and showed a slight decrease from the previous measurement period. From lead peroxide candle data, the average sulfur dioxide concentrations from 29 monitoring stations was 0.13 mg/100 sq cm/day as compared to 0.30 mg in the preceding year. As measured by the electroconductivity method, the SO2 average for the period was 0.008 ppm-0.015 ppm as compared to 0.013-0.015 ppm in the preceding year. Suspended particulates were 0.015 mg/cu- 0.025 mg/cu m, about the same as the preceding year. The monthly average of nitrogen oxides was 0.02-0.03 ppm, and the annual oxidant average was 0.04 ppm.

55120 **APTIC NO. 79104**

Council on Environmental Quality

AIR QUALITY. *In: OCS Oil and Gas -- An Environmental Assessment, p. 5B-28 - 5B-34, April 1974.*

Several areas around Jacksonville are at or near the primary standards for particulates. Ambient air concentrations of sulfur oxides are below the federal standards. Hydrocarbons are classified as Priority I by the Environmental Protection Agency, with most emissions attributed to transportation sources. Carbon monoxide and nitrogen oxides are not major problems. Air quality in the Northeast Florida/Southeast Georgia region is very similar to that in the Jacksonville locality. All of the pollutant impact loadings should increase base case loadings between 15 and 30% except for hydrocarbons, which are 60% over Base Case 1 conditions for the yr 2000. Carbon monoxide loadings decrease from the 1972 level in all cases due to emission controls on mobile sources. Hydrocarbon loadings in aggregate are expected to decrease from 1972 levels in all cases, except Base Case 2 high conditions for the yr 2000. Aggregate particulate and nitrogen oxide pollution loadings are expected to increase significantly due to the increased level of fossil fuel combustion. The Northeast Florida/Southeastern Georgia region should have an impact virtually the same as the Jacksonville locality, except that the hydrocarbon and carbon monoxide loading impacts should be moderated somewhat by the yr 2000.

1973

55121 **APTIC NO. 79042**

Bini, Giuseppe

LEAD IN THE URBAN ENVIRONMENT - 2. *Int. J. Environ. Studies, 5(2):131-135, 1973. 22 refs.*

The problem of urban lead contamination is discussed, with particular emphasis of airborne lead pollution in European cities resulting from automobile exhaust emissions. Ambient lead levels in European cities range from 0.5 micrograms/cu m in low traffic areas to greater than 10 micrograms/cu m at congested city intersections. These levels are particularly serious in view of the observation that lead inhaled from natural aerosols results in lung depositions of 27-62% in man. Increasing ambient lead concentrations and uncertainty regarding safe blood lead levels call for the removal of lead from gasoline.

55122 **APTIC NO. 79461**

Elshout, A. J. and J. W. Viljeer

PRELIMINARY STUDY OF THE SULFATE AND SULFURIC ACID CONTENTS IN THE ATMOSPHERE IN THE NETHERLANDS. *(Een inleidend onderzoek naar het gehalte aan sulfaten en zwavelzuur in de atmosfeer in Nederland). Text in Dutch. Elektrotechniek, 51(11):566-570, Sept. 1973. 12 refs.*

Measurements of airborne sulfates and sulfuric acid were made in the Netherlands. The amount of ambient sulfuric acid was generally low. The measured ratio of sulfate to total sulfur was correlated with the relative humidity and showed a decrease with increasing sulfur dioxide concentration. The conversion rate of SO2 transported from Germany to the Netherlands was estimated at about 1%/hr. A correlation between the amount of sulfates and atmospheric ammonia was found for summer days with a relative humidity of over 80%, suggesting an acceleration of the oxidation by NH3. Most of the sulfates and nitrates observed in aerosols appeared to be present in the form of ammonium salts.

55123 **APTIC NO. 79431**

Mamuro, Tetsuo, Tadao Matsunami, Yatsuka Matsuda, and Akira Mizohata

PRELIMINARY MULTIELEMENT ANALYSIS OF SIZE-SEPARATED AIRBORNE DUST PARTICLES. *Annu. Rep. Radiat. Cent. Osaka Prefect., vol. 14: 5-10, 1973. 4 refs.*

Neutron activation multielement analysis of size-separated airborne dust samples collected by an Andersen sampler was performed. Elements such as scandium, iron, cerium, samarium, and thorium tended to increase in concentration with particle size. Most of these elements appeared to be from terrestrial origins. Elements such as zinc, arsenic, selenium, bromine, and antimony showed the reverse trend (concentrations decreased with particle size) and appeared to be mainly from industrial origins. The concentrations of sodium, chromium, cobalt, and cesium were not related to particle size. (Author abstract modified)

55124 **APTIC NO. 79565**

Mamuro, Tetsuo, Yatsuka Matsuda, and Akira Mizohata

COMPARATIVE MULTIELEMENT ANALYSES OF AIRBORNE PARTICULATE SAMPLES COLLECTED IN VARIOUS AREAS. *Annu. Rep. Radiat. Cent. Osaka Prefect., vol. 14:11-18, 1973. 4 refs.*

Multielement analyses by instrumental neutron activation analysis and radioisotope energy dispersive X-ray fluorescence analysis were applied to 31 airborne particulate samples collected in 15 different areas in Japan. The samples were collected by 19 micron cut samplers in areas such as clean seaside areas, heavily industrialized areas, small industrially developing cities along the Inland Sea or the Pacific Ocean, and cities with single industries. The atmospheres over all locations are quite different not only in the extent of the pollution, but in the pollution pattern. The air quality measurements are tabulated for all locations and elements.

55125 **APTIC NO. 77120**

Minegishi, A., Z. Shinozaki, H. Morishima, T. Hirono, K. Akino, and T. Ohira

STUDY ON ELECTRONIC SPIN RESONANCE ABSORPTION (ESR) OF AIR DUST IN TOKYO. *(Tokyoto ni okeru kukijin no denshi supin kyomei kyushu(ESR) ni kansuru kenkyu (II)). Text in Japanese. Tokyo Aisotopu Sogo Kenkyusho Nenpo (Tokyo Met. Isotope Gen. Res. Inst. Annu. Rept.), p. 36-37, 1973.*

Measurements were made of the electronic spin resonance spectrum from June to August, at one spot, and May to September, 1972, at three spots, 2 km from where students were affected by photochemical smog. Measurements were taken at 12-day intervals, from 10 am until 10 am the following day, using a high-volume air sampler. For comparison, dust in the air at a remote island of the Bonin Islands was collected. No incidence as high as that in Osake (100 gauss half-value, g equalling 2.00) occurred. A correlation existed between ESR strength and dust weight. When more than 10 people were affected by photochemical smog on June 26, the ESR increased reflecting a change in the photochemical smog. However, there was no clear correlation between dust weight and various pollutants. This may have been due to fewer samples or to the fact that the dust was collected for 24 hr, so that a characteristic time period of photochemical smog was not established.

55126 **APTIC NO. 77193**

Minegishi, A. and Z. Shinozaki

STUDY ON ELECTRONIC SPIN RESONANCE ABSORPTION (ESR) OF AIR DUST IN TOKYO. *(Tokyoto ni okeru kukinjin no denshi supin kyomei kyushu (ESR) ni kansuru kenkyu (I). Text in Japanese. Tokyo Aisotopu Sogo Kenkyusho Nenpo (Tokyo Met. Isotope Gen. Res. Inst. Annu. Rept.), 33-35, 1973.*

In Osaka, on June 27, 1971, there was intense photochemical smog, and an unusually strong ESR (100 gauss), centering around g equals 200, was observed. Experiments were performed in Tokyo by students at the Taishido Junior High School every day from June to August 1973, from 10 am to 3 pm to 12:30 on Saturdays. They measured an ESR of 500 gauss, centering around g equals 2.15 plus or minus 0.03. Electronic Spin Resonance correlated with sulfur oxides, with a correlation coefficient of 0.90. However, on unusual days, the ESR was 1.4 to 2 times greater than the expected figure for that particular day. A similar correlation was found in the case of sulfur dioxide. There are several causes of increased ESR on unusual days. Some transition metal compounds in dust are affected by mechanisms such as strong acidity, which changes the valence state and induces a strong ESR. Submicron particulates in the atmosphere become larger, or adhere to giant dusts and are trapped on the filter paper of an air sampler, increasing the ESR signal. A weaker correlation was found between dust weight and sulfur oxides. Unusual days were those when the oxidant concentration was over 8 ppm and the ESR was over 500.

55127 **APTIC NO. 79494**

Morik, J., Magdolna Kerteszne Saringer, and Tibor Varkonyi

EXAMINATION OF THE AIR POLLUTION IN DUNAUJVAROS. *(Levegoszennyezodes vizsgalatok Dunaujvarosban). Text in Hungarian. Egeszsegtudomany, 17(3):209-218, July 1973. 4 refs.*

Air pollution measurements were made in Dunaujvaros in order to determine whether the population is duly protected. The mean values of air pollution in Dunaujvaros were: dust deposition 26.20 g/sq m/30 days; suspended particulates, 165/ml; total sulfur, 7.64 mg/100 hr; and sulfur dioxide, 0.51 mg/cu m. Modern practices for location of industry assure a more favorable situation with respect to air purity than that in older towns. If extensive industrial establishments with considerable soiling exist in a town, augmentation of the protective distances and strict observance of the protective precautions are indispensable. (Author abstract)

55128 **APTIC NO. 76926**

Kanagawa Prefecture Environmental Protection Center

DISTRIBUTION OF AIR POLLUTION FROM HYDROCARBONS OR NITROGEN OXIDES IN SEASIDE INDUSTRIAL AREAS. *(Rinkai kogyo chitai ni okeru tanka suiso chisso sankabutsu to no osen bunpu). Text in Japanese. Kanagawa-ken Taiki Osen Chosa Kenkyu Hokoku (Tech. Rept. Air Pollution Yokohama-Kawasaki Ind. Area), no. 15:259-264, Feb. 1973.*

The distribution of air pollution by hydrocarbons or nitrogen oxides in seaside industrial areas was studied and compared with that of intersections of heavy traffic volume and of an ordinary environment. Sulfur dioxide or hydrocarbons in seaside industrial areas showed higher concentrations than those in the other two areas. The NO concentration of intersections of heavy traffic volume showed high values followed by seaside areas, and an ordinary environment. Generally NO concentration reached a high point two times per day, early in the morning and toward evening. The same was true of hydrocarbons. The concentrations of hydrocarbons measured in seaside industrial areas were mornings, while high concentrations were recorded for NO2 and sulfur oxides. The ratio of unsaturated hydrocarbons to the total hydrocarbons was 30% in intersections of heavy traffic volume and in seaside industrial areas. It was about 10% in an ordinary environment. Hydrocarbons and nitrogen dioxides in seaside industrial area and in an ordinary environment had relatively normal distribution curves. The intersections of heavy traffic volume had a distribution curve extending at points of high concentration. The concentrations of sulfur oxides in the industrial area were 2.5 times as high as in ordinary environment, on the average. Some correlations were found between the concentrations of pollutants and meteorological conditions. There was a tendency toward decreasing concentrations of pollutants with increasing wind velocity.

55129 **APTIC NO. 77058**

Osaka City (Japan)

THE PRESENT STATE OF AIR POLLUTION AND THE POLLUTION COUNTERMEASURES IN OSAKA CITY. *(Osakashi no kogai no genkyo to taisaku). Text in Japanese. Osaka City Government, Aug. 1973. 279p.*

The average dust concentration measured at 15 locations by the dust jar method from 1959 to 1972 showed a steady decrease from 17.81 ton/sq m/month in 1961 to 10.20 ton/sq m/month in 1972. The average sulfur dioxide concentration measured at 12 locations by the conductivity method from April 1972 to March 1973 was 0.039 ppm, a decrease of about 28% from the previous year. The average airborne particulate concentration of the same 12 locations in 1972 was 103 microgram/cu m, only a slight decrease from 109 microgram/cu m of the previous year. The average carbon monoxide concentration measured at 8 locations by the NDIR (non-dispersive infrared analyzer) method from April 1972 to March 1973 was 5.7 ppm, a slight increase from 5.2 ppm from the previous year. The average nitrogen dioxide concentration also showed a slight increase from 0.053 ppm to 0.055 ppm during the same period of time from 1971 to 1972. A clean-air plan was introduced in August 1971, aiming at reducing all pollutant concentrations to below environmental standards by 1980. The countermeasures imposed by the clean air plan included recommendations for the installation of a desulfurization apparatus and a change of fuel, as well as the enforcement of automobile inspection. As a result, the average SO2 concentration in 1972 was reduced significantly to a level below the environmental standard.

1959

55130 **APTIC NO. 77069**

Kay, Kingsley

ENVIRONMENTAL ARSENIC CONTAMINATION AND CONTROL IN SMELTING OPERATIONS. *Clean Air Society, Clean Air Soc. Conf., 1st, Proc., 1959, p. 86-90. 4 refs. (Oct. 1.)*

Arsenic levels in tap water, vegetation, dust fall, and urine from schoolchildren were measured in a densely populated area of Canada situated between two gold smelters discharging arsenic- bearing roaster fumes. The dust fall levels within a mile radius of each smelter ranged from less than 1 to 11 lb/acre/yr at one smelter location and from less than 1 to 5.5 lb/acre/yr at the other smelter location. Levels decreased after the installation of a Cottrell precipitator at one smelter. Vegetation levels of arsenic at the townsite were between the levels of mine area samples. Urinary levels of arsenic for schoolchildren living in the area were significantly higher than those of a control group, although hospital records showed no effects due to arsenic.

ATMOSPHERIC INTERACTION

1975

55131 **APTIC NO. 79356**

Allario, Frank and R. K. Seals, Jr.

MEASUREMENTS OF NH3 ABSORPTION COEFFICIENTS WITH A C(13)O2(16) LASER. *Appl. Opt., 14(9):2229-2233, Sept. 1975. 11 refs.*

Measurements of ammonia absorption coefficients are presented for several transitions of a carbon 13 oxygen 16 laser for small concentrations of NH3 for absorption lines broadened to 1 atm with nitrogen. Ammonia absorption coefficients were determined for laser transitions R(8) (920.2194/cm) to R(28) (933.8808/cm) of the 00 deg 1 - (10 deg 0, 02 deg 0)I band. The strongest absorption coefficient (K equals 36.09 + or - 1.43 (atm-cm) (to the - 1 power) was measured for the R(18) transition for the NH3 line, aQ(6 6), and is larger than has been found in any previous measurements with a CO2 laser. The dependence of K on total pressure is also obtained for select transitions, and the frequency separation between the R(18) laser transition and the neighboring NH3 line (aQ(6,6)) is 550 + or - 30 MHz. These results are significant for long path absorption monitoring of NH3 with carbon dioxide lasers since the path length can be reduced by approximately 40% and for heterodyne detection of NH3 since the relative position of the laser transition to the NH3 absorption line is well within the bandpass of mercury cadmium-tellurium photomixers. (Author abstract)

55132 **APTIC NO. 77132**

Augustine, Frank E. and Richard W. Boubel

PARTICLE SIZE DISTRIBUTIONS OF KRAFT PAPER MILL AEROSOLS OBTAINED BY AIRBORNE SAMPLING. *J. Air Pollution Control Assoc., 25(6):617-621, June 1975. 8 refs.*

Size distributions of particles at several downwind points in a Kraft paper mill plume were determined by means of airborne sampling. Nucleopore filters were used as the primary sampling filters. Size distributions from samples close to the stack have a log normal frequency distribution, but, significant deviations from the log normal were found farther downwind. Several possible physical mechanisms are postulated as causes for this behavior, including breakup of agglomerated particles after exit from the stack, loss of water from particle droplets due to evaporation, dilution of the plume with particles of a smaller average size, and downwind agglomeration of particles. Plume dilution with background particles appears to be the most likely mechanism. (Author abstract modified)

55133 **APTIC NO. 79324**

Barrett, Alan H. and Kai S. Lam

PRESSURE BROADENING CALCULATIONS APPLIED TO MICROWAVE ABSORPTION OF OXYGEN AND WATER VAPOR IN THE ATMOSPHERE. *RLE (Res. Lab. Electron.), Prog. Rept., no. 116:55-56, July 1975. 11 refs.*

Pressure broadening calculations are applied to microwave absorption of oxygen and water vapor in the atmosphere. To calculate the absorption coefficient in the atmosphere, matrix elements for N up to 33 are required; an extrapolation procedure was adopted to determine elements for N is greater than 11. A diagonalization and inversion process of the 102 by 102 matrix is required for each set of values of temperature and pressure, but not for each observing frequency. Preliminary results for absorption coefficients were obtained in the 50-70 GHz band for temperature (T) equals 300 K, pressure equals 760 torr and T equals 210 K and P equals 150 torr, corresponding respectively to ground level and the lowest layers of the tropopause. Comparison with results from noninterference theories using the Gross line shape and empirically determined parameters revealed that the lines are much less well resolved because of overlapping effects. Formulations for water absorption calculations have also been carried out.

55134 **APTIC NO. 77293**

Bessemoulin, Pierre J., M. Hausard, and Jean C. Boulay

STUDY BY A HYDRAULIC METHOD OF THE INFLUENCE OF TOPOGRAPHY AND LOW STRUCTURES ON THE AIR FLOW OVER THE HARBOR OF MARSEILLES (FRANCE). *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston Mass., June 15-20, 1975, Paper 75-17.5.)*

Hydraulic modeling was used to study the influence of topography and low structures on the air flow in the Harbor of Marseilles and to investigate the diffusion of pollutants from high stacks, including optimal stack height. A scale model (1/10,000) of the harbor s topography up to 30 km upwind resulted in excellent agreement with field data concerning mean wind direction for a given synoptic wind, mean wind speed, and amplitude of wind speed fluctuations. A model consisting of an isothermal water tank for reproducing a neutral atmosphere gave good agreement with field data during the study of pollutant dispersion from a 305-meter high stack located in a mountainous area of the United States. An effective stack height of 620 m was sufficient to overcome the topographical influences of the area on pollutant dispersion. (Author abstract modified)

55135 **APTIC NO. 77233**

Bolin, Bert, and Christer Persson

REGIONAL DISPERSION AND DEPOSITION OF ATMOSPHERIC POLLUTANTS WITH PARTICULAR APPLICATION TO SULFUR POLLUTION OVER WESTERN EUROPE. *Tellus (Uppsala), 27(3):281-310, 1975. 20 refs.*

The basic transfer equation interrelating sources and sinks for atmospheric pollutants through the turbulent processes in the atmosphere is reformulated in a statistical manner, which assumes in some regards a statistical independence of the physical and chemical processes being considered. Since on the regional scale the synoptic disturbances are the essential turbulent elements, their statistics are considered in some detail using geostrophic trajectory computations. Small scale atmospheric turbulence, convection, and large scale vertical motion generated by synoptic disturbances are analyzed with regard to their importance for vertical transfer. The sink mechanisms of rain-out and wast-out (interior sinks) and direct deposition at the lower boundary (boundary transfer) are also described statistically. The outline of a regional dispersion model is developed and its advantages and limitations are discussed. As an example a simplified study of the emission, dispersion and removal of atmospheric sulfur is presented. (Author abstract modified)

55136 **APTIC NO. 79444**

Chylek, Petr, G. W. Grams, G. A. Smith, and P. B. Russell

HEMISPHERICAL BACKSCATTERING BY AEROSOLS. *J. Appl. Meteorol., 14(3):380-387, April 1975. 7 refs.*

Hemispherical backscattering cross sections of spherical particles were calculated using a recently derived analytical expression, and the results were compared with values obtained by numerical integration. The analytical formula not only gave correct values of the hemispherical backscattering cross sections but also saved computer time. The analytical expression also provided better insight as to how the hemispherical backscattering cross section behaves under various approximations or limiting conditions. As an aid in utilizing simple models of climate change due to aerosols, the percentage of incident solar radiation scattered into the backward hemisphere was calculated for a range of particle sizes and complex refractive indices. Similar calculations were also made for the ratio of absorption to hemispheric backscattering, another critical parameter in many aerosol climate models. (Author abstract modified)

55137 **APTIC NO. 79122**

Daniels, Anders, Wilfrid Bach, and Karl How

PREDICTION OF AIR POLLUTION CONCENTRATIONS FROM AGRICULTURAL BURNING. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1975. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-26.4.)*

A source-oriented air pollution monitoring program for agricultural burning in Hawaii is described along with a simulation technique for estimating field emission rates and ambient pollutant concentrations. The simulation model is a time-stepping modified limited Gaussian line source model. A comparison of measured concentrations and calculated emission values from a selected cane field burn reveals good agreement between the average calculated emission rate and that obtained from actual measurements. Individual estimates show considerable variation, however. The advantage of the simulation approach as compared to burning tower studies is that ambient pollutant levels can be assessed in addition to emission rates. (Author abstract modified)

55138 **APTIC NO. 79097**

Davis, D. D. and Gary Klauber

ATMOSPHERIC GAS PHASE OXIDATION MECHANISMS FOR THE MOLECULE SO2. *Preprint, Maryland Univ., College Park, Md., Chemistry Dept., 14p., 1975 (?). 18 refs.*

Homogeneous gas phase oxidation processes which are possibly involved in the atmospheric conversion of sulfur dioxide to sulfuric acid and aerosol are reviewed. The rate constants for nine possible initiating steps are considered along with model calculated concentration data. These data suggest that in both the stratosphere and unperturbed troposphere the most important initiating step is the reaction of hydroxyl free radicals with SO2. The results from recent aircraft samplings of trace gases in power plant plumes suggest the importance of gas phase free radical chemistry during summertime conditions for the conversion of SO2 to H2SO4. (Author abstract modified)

55139 **APTIC NO. 79205**

Davis, W. E. and J. A. Young

RESULTS OF IN CLOUD TRACER RELEASES IN FRONTAL STORMS. *Battelle Memorial Inst., Richland, Wash., Pacific Northwest Labs., Atomic Energy Commission Rept., 28p., 1975 (?). 16 refs.*

NTIS: BNWL-SA-5097

Various tracers were injected into six frontal storms to study the process of in-cloud scavenging. Organized tracer deposition patterns were observed in at least three of the six storms injected with tracer material. Maximum tracer deposition appeared to occur 20-40 nautical mi downwind from the area where the vertical wind profile coupled with fall velocities of 1-5 m/sec favored initial ground deposition. Possible causes for the displaced maxima in particle deposition were increased rainfall (causing increased deposition) and/or delays in maximum deposition time associated with the attachment coefficient of the tracer to the cloud water. (Author abstract modified)

55140 **APTIC NO. 79381**

Dickinson, Robert E.

METEOROLOGY OF THE UPPER ATMOSPHERE. *Rev. Geophys. Space Phys., 13(3):174-188, July 1975. 348 refs.*

Progress over the last 4 yr in upper atmospheric meteorology is reviewed. Recent studies on the heat input role of atmospheric radiation are reviewed. The relationships between stratospheric and mesospheric chemistry and other meteorological processes have developed into a highly fertile research area. Progress over the last few yr in studies of the mesosphere and lower thermosphere has been confined largely to steady improvement in the quality and quantity of available data, whereas fundamental problems have remained largely intractable. The developments in the last 4 yr also include a description of seasonal, latitudinal, and diurnal variations of winds and composition in the thermosphere and significant advances in interpreting various upper atmosphere circulation systems in terms of coupling to the troposphere by various types of tropical and extratropical wave processes. The use of mass spectrometers for measuring composition of the thermosphere is a notable methodology. Numerical models of dynamic processes have increased in sophistication with extension of tropospheric general circulation models to stratospheric levels and development of a large number of different simplified dynamic models for treating various aspects of thermospheric dynamics. (Author abstract modified)

55141 **APTIC NO. 77096**

Fabrick, Allan J. and Ralph C. Sklarew

CROSS EVALUATION OF REGIONAL AIR POLLUTION MODELS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-04.6.)*

Mathematical models are necessary to relate ambient air quality to emissions from specific sources. The required characteristics for such a model include: (1) prediction of air quality for averaging times comparable to those of the standards, (2) ability to treat major point sources of pollutants and area sources of many minor ones, (3) ability to determine air quality throughout a region as well as at specific locations, (4) accuracy, and (5) simplicity. A grid model (GRID) and a Gaussian plume model (PTMTP) were evaluated for 24 hour averages; and GRID, a Climatological Dispersion Model (CDM), and a Climatological Dispersion Model allowing for curved winds (CDMC) were evaluated for annual averages. Each model was calibrated for the Portland, Oregon area. CDMC and an annual GRID model were also calibrated for the Columbia River Valley as a whole, and CDM and an annual GRID model were also calibrated for the Longview, Wash. area. On the basis of the calibrations, an annual GRID model was selected as most promising for the Columbia River Valley as a whole, CDMC for the Portland area, and CDM for the Longview area. These models were then evaluated using 1972 data. They were only slightly less accurate than the calibration with 1973 data. The authors recommend GRID in large regions with complex winds, and CDMC where identification of pollution sources is important.

55142 **APTIC NO. 79310**

Fujiwara, Motowo, Toshikazu Itabe, and Motokazu Hirono

SUDDEN INCREASE OF STRATOSPHERIC AEROSOL CONTENT AFTER THE ERUPTION OF FUEGO VOLCANO: LIDAR OBSERVATIONS IN FUKUOKA. *Rep. Ionos. Space Res. Jap., 29(1/2):74-78, 1975. 10 refs.*

The results of 5 mo of lidar observations from Oct. 1974 to Feb. 1975 in Fukuoka are reported. An extraordinary intense scattering was observed from a thin layer in the lower stratosphere over Fukuoka, from middle Nov. 1974, about a month after the eruption of Fuego volcano in Guatemala. Based on the volcanic dust hypothesis, the speed of meridional transport is estimated at 50 cm/sec. Local rawinsonde data show an increase of 5 C in temperature around the layer at the same time. The maximum of the peak values of the non-Rayleigh backscattering coefficient beta M occurred in Dec., reaching some 10 times those of the pre-volcanic layer. The layer began to spread out toward the lower altitudes a month after its appearance, and to vary in structure significantly in association with the variation of temperature, persisting from the day of the first detection throughout late Feb. 1975. (Author abstract modified)

55143 **APTIC NO. 79384**

Gourmel, M. and J. Lacaze

MEASUREMENT OF THE PRECIPITATION PH AT PAU-CASINO: RELATIONSHIP WITH METEOROLOGICAL PARAMETERS. *(Mesures du pH des precipitations atmospheriques a Pau-Casino: Liaisons avec les donnees meteorologiques). Text in French. Meteorologie, 5(33):21-32, Jan.-March 1975. 3 refs.*

Systematic measurements of the precipitation pH were carried out at Pau-Casino in an attempt to establish correlations with different meteorological parameters. The average pH values were 5.1 in 1970, 4.8 in 1971, 5.0 in 1972, and 5.5 in 1973. No seasonal variations were observed. The duration of the precipitation, the rain yield, and the intensity of the precipitation has no influence on the rainwater pH. No definite relationship was established between the pH value and the storms. For pH values below 5.8, and especially for those below 5, high frequency of winds blowing from the Lacq industrial area with high air pollution level was established.

55144 **APTIC NO. 76958**

Hamanaka, H.

ENFORCEMENT OF TOTAL EMISSION REGULATIONS AND ACCOMPANYING PROBLEMS. *(Soryo kisei no jisshi to sono mondaiten). Text in Japanese. Kuki Seijo (Clean Air-J. Japan Air Cleaning Assoc., Tokyo), 12(8):24-30, April 1975.*

Problems which may occur in the enforcement of total amount emission standards (effective November 1974) are discussed. A shift in emphasis is seen in total amount emission regulations toward the establishment of pollutant standards by local authorities rather than the national government, made possible by advances in computer simulation techniques. Permissible amounts of sulfur oxides emission can be calculated from either of two equations: an equation based on amounts of raw materials and fuel used by all soot-emitting installations in a specified factory; and an equation based on the maximum compound ground concentration of SOx emitted from all soot-emitting installations in a specified factory. Three atmospheric pollutant diffusion equations recommended for simulation calculations are the Moses and Carson, CONCAWE, and Briggs equations. To determine the applicability of calculated standards, three points should be considered: The slope of the straight-line sweep should be in the range of 0.8-1.2, preferably close to 1; correlation coefficients must be greater than 0.71, preferably over 0.8; and calculated values for concentration patterns must agree with observed values. Simulation models must be accurate and be adaptable to changing conditions. Accurate short-term air pollution forecasting models must be deveoped. Diesel-burning trucks and ships must be regulated. Disposal of secondary pollutants resulting from installation of desulfurization equipment must be considered in the future. A change in fuel from oil to gas is indicated in some situations, with possible inducement by loans and subsidies. A diagram of systems simulation is included.

55145 **APTIC NO. 79373**

Hamanaka, H.

ATMOSPHERIC DISPERSION CALCULATION METHOD PERTAINING TO THE REGULATION OF THE TOTAL EMISSION. *(Soryo kisei ni tomonau taiki kakusan keisan shuho ni tsuite). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 4(9):638-642, Sept. 1975.*

In total emission quality control, the total allowable emission quantity for individual pollutant sources is determined, and the target of reduction is calculated based on the environmental standards. Calculation methods for the target quantity of reduction include the simple proportion method based on the assumption that the pollutant concentration is proportional to the pollutant quantity emitted, macro-models based on statistical treatment, and atmospheric dispersion models using meteorological conditions as parameters. Atmospheric dispersion calculation methods are described, with discussion of the problems involved. The checking method for the adequacy of models and preparation of models based on pollutant source data, and estimation of effective stack height, wind factor, atmospheric stability, and altitude of mixed layer are also discussed.

55146 **APTIC NO. 77158**

Harrison, A. W.

N2O AND H2O ATMOSPHERIC THERMAL EMISSIONS. *Can. J. Phys., 53(7):674-682, April 1, 1975. 16 refs.*

Atmospheric thermal emission spectra (4.1-6.3 micron) were measured at a spectral resolution of 140 A under clear skies for low ground temperatures (about 273 K) and low absolute humidities (about 1.6 g/cu m). Specific emission features attributed to atmospheric water and nitrous oxide were interpreted in terms of a simple layer model of the atmosphere. Spectra obtained from a brown smog and an ice fog urban atmosphere were compared with spectra from a clear atmosphere. Attempts to substract the thermal emission spectrum of clean air from that of polluted air in order to establish the presence of the carbon monoxide emission band alone were not successful. Under conditions of temperature inversion, the thermal emission was characteristic of an emitting temperature several degrees higher than the measured ground temperature. The absolute humidity at ground level was not a reliable indicator of the effective water vapor concentration responsible for the emission in the atmospheric window near 5 micron. Variation in the thermal emission of the atmospheric window with elevation angle was explained with the simple layer model. (Author abstract modified)

55147 **APTIC NO. 79479**

Hashimoto, Yasutaka

ON AIR POLLUTION MECHANISM BY LOCALLY-EMITTED DUST PARTICLES AND HEAVY METALS CONTAINED IN THOSE POLLUTANT MATERIALS: DUST DIFFUSION AND EMPIRICAL EQUATIONS. *(Kyokusho-gata jinai busshitsu ni yoru taiki osen kijo to sono osen busshitsu ni fukumareru jikinzoku rui ni tsuite). Text in Japanese. Kuki Seijo (Clean Air - J. Japan Air Cleaning Assoc., Tokyo), 12(5):27-42, Jan. 1975. 18 refs.*

A model pattern of pollution for 1-ton dust discharge from a source was empirically derived. Dust particles, mostly coke, were collected at a stack dust collection unit, labeled with pigment, and discharged into the air, after suitable treatment. Typical composition of the labeled coke was: coke, 100.0 kg; pigment (Blue poster color Sakura), 5.0 kg; binder (acrylic acid), 1.5 kg; water, 40.0 kg. Brilliant Red and Brilliant Yellow F.G. were also used as tracer pigments. Dust particles which fell to the ground were collected and analyzed with a microscope. An elongated, roughly diamond-shaped pattern of dust diffusion was found, with the source located at the vertex at one end of the elongation. Attempts were made to compare experimental results with the theoretical formulas derived from Navier-Stokes theory. Horizontal width of diffusion of the dust particles was very narrow, and behavior depended on weight and weather conditions. Dust deposition (particulate size above 100 micron) was most pronounced at distances of 500 to 700 m from the source. From 1000 to 1500 m, amount of dustfall became more or less constant (0.0154 g/sq m). The quantity of precipitation decreased at distances over 2000 m, because the dust particles became suspensions.

55148 **APTIC NO. 77051**

Hayashi, Masayasu, Minoru Gamou, and Susumu Yamamoto

THE OBSERVATION METHOD OF LOW STRATA ATMOSPHERE AND ITS APPLICATION TO AIR POLLUTION EVALUATION. *(Teiso taiki no kansokuho to taiki osen hyoka e no oyo). Text in Japanese. Preprint, Agency of Industrial Technology and Science, Tokyo (Japan), p. 71-75, 1975. 6 refs. (Presented at the National Research Institute for Pollution and Resources Meeting, 4th, July 9-10, 1975.)*

Smoke diffusion models were calculated using data from meteorological observations of atmospheric strata about 2 km above the ground, including data on atmospheric stability, turbulence, and dispersion. Models were constructed of smoke diffusion in the atmosphere, separating it into two processes, the rising process, due to kinetic nature of smoke and the rising caused by heat, and the diffusion process, due to turbulence in the atmosphere. Meteorological conditions were classified according to the degree of stability, taking wind velocity, representative wind velocity, insolation, and cloud volume into account. When there was no wind, with wind velocity of less than 1 m/sec, the rise of smoke was calculated using the Briggs formula. Smoke diffusion was calculated by the so-called Puff formula. On windy days, the rise of smoke was calculated with the Moses- Carson formula. Smoke diffusion in the absence of wind was calculated with the Broom formula. These models were compared with the actual data obtained at the Kashima coastal industrial area. Although there were no data on insolation, the wind volume observed at Choshi was substituted. Although these models were formulated based on substances which do not undergo qualitative changes, they can also be applied to photochemical smog, when there is qualitative change.

55149 **APTIC NO. 78985**

Heidt, L. E., R. Leub, W. Pollock, and D. H. Ehhalt

STRATOSPHERIC PROFILES OF CCl_3F AND CCl_2F_2. *Geophys. Res. Lett., Preprint, National Center for Atmospheric Research, Boulder, Colo., 7p., 1975. 4 refs.*

Samples of CCl_3F (trichlorofluoromethane) and CCl_2F_2 (dichlorodifluoromethane) in stratospheric samples were obtained from 1973 through 1975 by a balloon-borne cryogenic sampling system. Large air samples were collected for the laboratory analysis of a number of trace gases. Aliquots of the samples were stored and analyzed for their halocarbon content by gas chromatography with an electron capture detector. These measurements compare favorably with calculated predictions and support the prediction of stratospheric destruction of CCl_3F. (Author abstract modified)

55150 **APTIC NO. 79091**

Heimbach, James A., Jr, Arlin B. Super, and John T. McPartland

DISPERSION FROM AN ELEVATED SOURCE OVER COLSTRIP, MONTANA. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 15p., 1975. 19 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-26.6.)*

The effects of the semi-rugged terrain of Colstrip, Montana on the dispersion of a plume from an elevated source were investigated by tracking a silver iodide tracer released from an effective height of 500 ft above the general terrain. The additional mechanical turbulence induced by the terrain played a significant role in the dispersion of the tracer. The horizontal diffusion was larger than that predicted by Turner s and Bowne s models at all downwind distances. The vertical diffusion over Colstrip compared favorably to Bowne s urban parameterization and verified his finding that vertical dispersion approaches a limit for large downwind distances. The horizontal and vertical diffusion rates were not well correlated; thus, a dual model which uses wind speed and lapse rate for predicting vertical diffusion and wind speed and direction for predicting horizontal transport is recommended for the area. (Author abstract modified)

55151 **APTIC NO. 77040**

Hirai, Eiji, Yoshishige Hayashi, Toshio Hirota, Akira Atsumura, Yoshitada Aoi, and Yoshiaki Kawabata

EXAMINATION OF THE REACTION MECHANISM OF LEAD DIOXIDE-SULFURIC ACID GAS. *(Nisanka namari-aryusan gasu kei no hanno kiko no kento). Text in Japanese. Preprint, The Society of Chemical Engineers, Japan, Tokyo, p. 250-251, 1975. 3 refs. (Presented at the Society of Chemical Engineers Japan, Lecture Meeting, 40th, Nagoya, Japan, April 2-4, 1975.)*

A study was done to clarify the reaction and absorption mechanisms of the lead peroxide candle method with regard to sulfur oxides and lead dioxide. The shell-shape model and reaction model equations were introduced, taking into consideration gas border diffusion within membranes, diffusion within solids, and chemical reactions. By making a sheet of pressed and molded PbO_2 powder and placing it in contact with sulfur dioxide gas, experimental data were obtained. From the curve- fitting of these data with the equations, a transfer coefficient of materials within the border membrane, an effective diffusion coefficient, and chemical reaction speed constants were sought. The shell-shape model in keeping with experimental data, and under the conditions of these experiments. Diffusion within border membranes and diffusion within solids underwent a rhythmical process. When the gas flow reached 1.0 l/min to 2.0 l/min, the diffusion process within solids had more resistance than the border membrane diffusion process.

55152 **APTIC NO. 79111**

Horak, Jiri

ON SOME OF THE PROPERTIES OF THE DISCRETE MODEL OF TURBULENT DIFFUSION. *Studia Geophys. Geod., 17(2):149-164, April 1975. 14 refs.*

A mathematical analysis of some of the properties of the discrete model of turbulent diffusion is presented. The relationship between the geometry of the random walk in the E2-space and the representation (transformation) corresponding to the selected structure of the process is investigated in terms of satisfying the conditions of irreversibility, ergodicity, and mixing. A random walk model of the Pascalean type is sleected to correspond to the theoretical ideas of the distribution of the substance in the turbulent flow field contained in the pattern of the solution corresponding to the transmission equation.

55153 **APTIC NO. 77095**

Hoult, D. P., S. R. O Dea, G. L. Touchton, and R. J. Ketterer

TURBULENT PLUME IN A TURBULENT CROSS FLOW: COMPARISON OF WIND TUNNEL TESTS WITH FIELD OBSERVATIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 20p., 1975. 8 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-49.1.)*

Plume rise downwind of a large stationary gas turbine was measured in the field, and the conditions were then scaled for turbulent cross flow wind tunnel tests. The plume exit conditions, wind velocity, temperature, and wind direction were matched in the laboratory. The buoyancy was best matched for high temperature exhaust by calculating a dimensionless density difference. The field and laboratory plume trajectories agreed quite well when properly calculated buoyancy length scales were used. The field data showed about 15% greater plume rise, while the median entrainment constant was about 10% greater for the lab test. The shape of the probability distribution matched very closely. (Author abstract modified)

55154 **APTIC NO. 77091**

Hoydysh, Walter G., Phyllis Diosey, and Tsuyoshi Yoshida

SCALING CONSIDERATIONS FOR SIMULATING PLUME RISE AND PLUME DISPERSION FROM GAS TURBINE GENERATORS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-49.5.)*

A wind tunnel study of the plume rise and dispersion from a scale model gas turbine was conducted to determine the factors affecting plume rise, plume dispersion, and downwash over a wide range of turbine operating conditions and wind conditions. Scale model tests were carried out in accordance with critical Reynolds number and Froude number or buoyancy length constraints. The effect of wind direction with respect to the rectangular stack as well as the effects of multiple plume interaction on plume rise were significant. The wind tunnel data showed good agreement with predictions by Briggs at low wind speeds. Plume downwash effects became important at wind speeds of 30 mph. (Author abstract modified)

55155 **APTIC NO. 79036**

Hrenko, Joan M. and D. Bruce Turner

AN EFFICIENT GAUSSIAN-PLUME MULTIPLE-SOURCE AIR QUALITY ALGORITHM. *Preprint, Environmental Protection Agency, Research Triangle Park, N. C., Meteorology Lab., 15p., 1975. 6 refs.*

An efficient Gaussian plume multiple source air quality algorithm is described. The algorithm can be used for estimating air quality concentrations of relatively stable pollutants for averaging times from an hour to a day in urban areas from point and area sources. The algorithm is applicable to locations with level or gently rolling terrain where a single wind vector for each hour is a good approximation of the flow over the source area considered. Calculations are performed for each hour. Hourly meteorological data required are wind direction, wind speed, stability class, and mixing height. Emission information required of point sources consists of source coordinates, emission rate, physical height, stack gas volume flow, and stack gas temperature. Emission data for area sources consists of south-west corner coordinates, source area, total area emission rate, and effective area source height. Computation time is kept to a minimum using a narrow plume hypothesis for estimating concentrations from area sources and using the area source squares as given rather than breaking down all sources to an area of uniform elements. The user has the option of choosing three different types of receptor locations: those whose coordinates are input by the user, those whose coordinates are determined by the model and are downwind of significant point and area sources where maxima are likely to occur, and those whose coordinates are determined by the model to give good area coverage of a specific portion of the region. (Author abstract modified)

55156 **APTIC NO. 77126**

Idso, Sherwood B.

LOW-LEVEL AEROSOL EFFECTS ON EARTH S SURFACE ENERGY BALANCE. *Tellus (Uppsala), 27(3):318-320, 1975. 11 refs.*

Measurements of incoming solar radiation, reflected solar radiation, net radiation, air temperature, humidity, and surface soil temperature were compared on a clear, initially cloudless day before and after a weak duststorm struck the area. The diffuse dust suspension extended to about 2000 m height and persisted past sunset. The abrupt drop in air temperature and increase in vapor pressure associated with the arrival of intense storms of this type were not observed. A plot of net radiation versus net solar radiation showed a distinct break at the time of the arrival of the dust, with a new relation of identical slope but different intercept prevailing for the remainder of the day. The effective atmospheric emittance was calculated, and it was determined that downward atmospheric thermal radiation increased about 10% with the introduction of the fine dust aerosol. To find the effect of the dust upon the transmission of solar radiation to the earth s surface, diurnal trends of this parameter were compared for the day of the dust storm and an essentially cloudless day two days later. The dust aerosol, though distinctly visible, produced no measureable effect upon the total transmission of solar radiation. Thus, the net effect of this small increase in low-level background aerosol concentration was to increase the total radiant energy received at the earth s surface. It appears that if man ever begins to raise the background aerosol content of earth s atmosphere through increased industrial activity, the global climate may initially become warmer, rather than cooler.

55157 **APTIC NO. 76924**

Ito, K.

FUTURE INDUSTRY AND ENVIRONMENTAL PROBLEMS, (3) AIR POLLUTION AND WEATHER. *(Korekarano sangyo to kankyo mondai, (3) Taikiosen to kisho). Text in Japanese. Sangyo Kogai (Ind. Public Nuisance), 11(1):45-50, Jan. 1975.*

Photochemical smog, weather and other physical phenomena are discussed, especially the smog in Hokkaido, Tokyo, Kawasaki city, and Yokkaichi city. The relationship of fog, highways, and car accidents are reviewed. Causes of fog formation and kinds of fog are discussed. The doughnut theory of photochemical smog around Kawasaki city is criticized for its one-sidedness.

55158 **APTIC NO. 79372**

Ito, S.

PRACTICAL SITUATION OF CALCULATION METHOD FOR ATMOSPHERIC DIFFUSION. *(Taiki kakusan keisan shuho no jissai). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 4(9): 651-659, 1975.*

In the total emission quantity control regulation introduced in the amendment to the Air Pollution Control Law, the atmospheric diffusion calculation method is employed. Descriptions of analysis methods for pollution patterns, determination of aerial range, and diffusion calculation methods based on the plume model and puff model at wind velocity higher than 1 m/sec and lower than 1 m/sec using vertical diffusions based on the Carpenter s atmospheric stability classification and Pasquill s atmospheric stability classification are given. Input data include meteorological data (wind direction, wind velocity, variation range of wind direction, insolation intensity, differential radiation intensity), pollutant source data, and pollutant concentration data. The analysis of input data; compound calculation method; and evaluation of adequacy in terms of the gradient of regression line, correlation coefficient, and concentration pattern are discussed. The diffusion calculation process for sulfur oxides is described with a flow sheet.

55159 **APTIC NO. 79128**

Janssen, Don W.

INTERIM INSTRUCTIONS FOR THE USE OF AIR STAGNATION WEATHER CHARTS AND MESSAGES (REVISION OF TECHNICAL NOTE 73-1). *Air Force Environmental Technical Applications Center, Washington, D. C. Rept. TN 73-1 (REV), 20p., Jan. 1975. 4 refs.*

NTIS, DDC: AD A004535

Instructions for the use of air stagnation weather charts and messages to assist in the forecasting of urban air pollution are presented. Available charts and teletype messages are described along with procedures for their use. Definitions are provided for dispersion criteria and stagnation areas. Details on the interpretation and tailoring of air stagnation facsimile charts to local requirements are also given.

55160 **APTIC NO. 79058**

Junge, C.

BASIC CONSIDERATIONS ABOUT TRACE CONSTITUENTS IN THE ATMOSPHERE AS RELATED TO THE FATE OF GLOBAL POLLUTANTS. *Preprint, American Chemical Society, Washington, D. C., 22p., 1975. 14 refs. (Presented at the American Chemical Society Meeting, Chicago, Ill., April 1975.)*

The processes determining the concentration of atmospheric constituents, the importance of atmospheric residence time to global transport and dispersion, and estimated residence times of chemically stable organic pollutants are discussed. Atmospheric constituents are divided into three main categories according to the types of processes determining their global concentrations. Accumulative gases accumulate in the atmosphere because they cannot form important compounds in the sedimentary shell. This category includes no pollutants. The second category of atmospheric gases is controlled by a chemical or physicochemical equilibrium of the earth s surface. Only water vapor and carbon dioxide belong to this category. The most important category includes the constituents whose concentrations are determined by dynamical steady state between sources and sinks. It comprises aerosols and all known trace gases except ozone, which is the only gas that cannot be placed into one of three categories. Removal of stable organic pollutants from the atmosphere can occur by destruction within the stratosphere, dissolution of the gas phase, and removal from the atmosphere by precipitation, attachment to atmospheric aerosols and subsequent removal by washout or rainout, and adsorption at the earth s surface. Stratospheric destruction is not important. Removal of the gas phase by rain is a rather inefficient process. Absorption on aerosols may result in global residence times of more than 100 days for polychlorinated biphenyls, mercury, and the chlorofluoromethanes. Excluding degradation in soils and sea water, permanent absorption to particles in soils and oceans, with subsequent sedimentation, seems to be the only nonchemical removal process with a long term efficiency.

55161 **APTIC NO. 77055**

Kanagawa, Akira and Takeshi Takahashi

EXPERIMENTAL EXAMINATION OF PHOTOMETER FOR MEASURING AEROSOL CONCENTRATION. *(Aerosoru nodo sokuteiyo fotometa no jikkenteki kento). Text in Japanese. Preprint, The Society of Chemical Engineers, Japan, Tokyo, p. 308-309, 1975. 1 ref. (Presented at the Society of Chemical Engineers Japan, Lecture Meeting, 40th, Nagoya, Japan, April 2-4, 1975.)*

The method of measuring the particle concentration of aerosol by scattering photometer permits direct and continuous measurement of aerosol. However, since the measured scattered light volume is a function of particulate distribution and concentration aerosol, it is necessary to indicate particle concentration in terms of particle diameter distribution. The effect of particle diameter distribution on the relationship between scattered light volume and particle concentration was studied, using a photometer lense at a cross angle of 60 deg and a lens opening angle of alpha equals 10 deg and beta equals 22 deg. The same results were obtained in sideways and forward scattering. Photometric measurements varied greatly with particle diameter, even though particle weight concentration was the same. The experimental data were in agreement with theoretical calculations.

55162 **APTIC NO. 79095**

Kellogg, William W.

CLIMATIC NON-LIMITS TO GROWTH. *Preprint, National Science Foundation, Boulder, Colo., National Center for Atmospheric Research, 19p., 1975. 51 refs.*

The possible extent of mankind s influences on the future climate are discussed. The approach to assessing human influences on climate involves evaluating present trends of human activities, defining how such activities change the environmental boundary conditions, use of climate models to estimate how such boundary condition changes will influence mean global surface temperature and precipitation, and use of a model to estimate future human development. An attempt is made to assess the magnitude of mankind s influences on climate and to compare them, in terms of surface temperature, with past natural changes. Surface changes, aerosols, carbon dioxide, and release of heat are considered. The most significant impacts that mankind is likely to have on the climate system boundary conditions are apparently all towards global warming. The major factor here is the added carbon dioxide, which is probably going to begin to have a noticeable effect in the next decade. Not only does the temperature of the polar regions respond much more to climate changes than the global average, but the behavior of the ice masses around the poles has an influence that extends far beyond the polar regions themselves. Any major change in the volumes of the ice sheets of the Antarctic or Greenland will affect sea level everywhere. A removal of the Arctic Ocean ice pack may very well mark an irreversible change of climate for the entire northern hemisphere. It seems very unlikely, in any case, that climate change will spell the doom of mankind and therefore be an ultimate limit to growth.

55163 **APTIC NO. 77052**

Kitabayashi, Koji, Kiyoshi Sugawara, and Shigeo Shimogata

WIND TUNNEL EXPERIMENTATION METHOD OF NON-NEUTRAL ATMOSPHERE AND DIFFUSION. *(Hichuritsu taiki to kakusan no fudo jikkenho) Text in Japanese. Preprint, Agency of Industrial Technology and Science, Tokyo (Japan), p. 55-70, 1975. 4 refs. (Presented at the National Research Institute for Pollution and Resources, Meeting, 4th, Saitama, Japan July 9-10, 1975.)*

Wind tunnel experiments of neutral and stabilized strata and diffusion are described. Although the wind tunnel experiment method of measuring stabilized stratum current is still being developed, it is the best method for estimating diffusion on streets and roads. In order to achieve similarity in air current, i.e., the average current, there must be similarity in the vertical distributions of wind velocity, in the vertical distributions of temperature, and local changes of wind direction. In order to satisfy these conditions, there must be a certain relationship between the physical volumes of the two currents. This can be found by the Richardson, Reynolds, Prantle, and Rosbie figures. In order to simulate a thermally neutral border stratum, for instance, turbulent current Reynolds figures may be made identical. In order to simulate border stratum and diffusion, there must be similarity in the turbulence current (change in volume), as well as similarity in average current, i.e., there must be correspondence of the vertical distribution of turbulence strength, similarity in the spectrum distribution of turbulence, similarity in the vertical distribution of the standard deviation of temperature changes, and similarity in the spectrum of temperature changes. Diffusion experiments by wind tunnel can be made by allowing smoke to flow, and by constant volume diffusion. Non-neutral atmosphere, classified into thermally unstable and stabilized atmospheres, was also tested by the wind tunnel method. For this it was necessary to have similarity in the vertical distribution of wind velocity, temperature, and the spectrum distribution of turbulence.

55164 **APTIC NO. 79506**

Klein, David H.

FLUXES, RESIDENCE TIMES, AND SOURCES OF SOME ELEMENTS TO LAKE MICHIGAN. *Water, Air, Soil Pollut., 4(1):3-8, March 1975. 18 refs.*

The influx of 28 elements to Lake Michigan is calculated from literature data on sedimentation rates and concentrations in sediments and water. Lake Michigan residence times are roughly 10,000 times lower than oceanic residence times. A mass balance calculated for 24 elements, with soil and aerosol deposition as the only sources, reveals fourfold excesses of copper, mercury, antimony, selenium, and vanadium. Order of magnitude deficits are calculated for calcium, magnesium, sodium, and chlorine. The mass balances account to within 50% for the observed inputs of silver, aluminum, arsenic, bromine, cobalt, chromium, iron, potassium, lanthanum, manganese, sulfur, silicon, scandium, thorium, and zinc. Except for Al, Co, La, Si, and Th, deposition from aerosol accounts for at least one-fifth of the total input. (Author abstract modified)

55165 **APTIC NO. 76966**

Koji, Masahiro

ON PROXIMITY OF THE OXIDANTS PEAK AND THE SO2 PEAK. *(Okishidanto to SO2 no peku ga kinsetsu suru gensho ni tsuite). Text in Japanese. Tenki (Weather), 22(5):229-236, May 1975.*

The cause of the proximate occurrence of peak levels of atmospheric sulfur dioxide and oxidant in Kobe city is investigated. High SO2 levels exceeding 10 pphm often occurred during similar days at the same time as peak oxidant levels which was from 1 pm to 3 pm. during this period, the areal wind direction was from the sea but this sea wind could not be considered as the cause of the areal high SO2 level due to the lack of pollution sources from this direction. The wind direction and temperature difference by altitude were measured. The temperature difference between the 100-60 m height region and 60-20 m region from 11 am to 1 pm was more than 1 C and the higher altitudes were at higher temperatures, which confirmed the presence of a inversion layer. The wind direction from 1 pm to 3 pm was southerly on the ground level and WSW at 100 m altitude. The southerly wind started blowing around noon and was breaking the inversion layer, which caused fumigation of SO2 at the higher altitude. There were several SO2 emission sources having effective chimney heights greater than 60 m, whose SO2 was transported by the WSW wind above the inversion layer. The general occurrence of daily maximum oxidant level was 1 pm to 3 pm, which coincided with the time of the breaking of the inversion layer.

55166 **APTIC NO. 76964**

Kojima, H. and S. Sekikawa

THE EXPERIMENT ON THE EFFECT OF PHOTOCHEMICAL REACTION ON CONDENSATION NUCLEI IN THE URBAN ATMOSPHERE. *(Toshi Taiki-chu ni okeru gyoketsu kakusu in oyobosu kokagaku hanno ryushi no yakuwari). Text in Japanese. Tenki (Weather), 22(3):125-130, May 1975. 14 refs.*

The number of condensation nuclei in the urban atmosphere is known to vary diurnally. The rapid increase in condensation nuclei at sunrise is be attributable to particles produced by photochemical reaction. The ratio of increase in total condensation nuclei due to particles produced by photochemical reaction was estimated based on the result of laboratory experiment; it was 20% even at mid-day when the concentration of particles produced by photochemical reaction reached its maximum. A description of experimental procedures and results of the measurement of particles produced by photochemical reaction are given. Data on the total number of condensation nuclei measured at Kagurazaka in Jan.-Feb. and June-July 1973 are also given.

55167 **APTIC NO. 77292**

Kramer, Mark L., Maynard E. Smith, Michael J. Butler, David E. Seymour, and Theodore T. Frankenberg

COOLING TOWERS AND THE ENVIRONMENT. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-17.3.)*

Measurements of natural draft cooling tower plume behavior, as well as meteorological variables, were obtained from aircraft flights near major power plants of the American Electric Power System. Saturation deficit proved to be the best index of plume persistence. During all flights when the saturation deficit exceeded 1.5 g/cu m at the centerline, the plume length was less than 1.5 mi. When the centerline saturation deficit was less than 1.5 g/cu m, the visible cooling tower plumes persisted from 2-20 mi. In addition to ambient humidity, atmospheric stability at plume elevation was also important. Cooling tower-induced fog at ground level was not observed during any of the tests. Aerodynamic downwash of the visible plume was also absent. The cooling towers did cause modification of natural clouds. Merging of the stack and cooling tower plumes was a common occurrence. (Author abstract modified)

55168 **APTIC NO. 79311**

Lamb, Robert G., Wen H. Chen, and John H. Seinfeld

NUMERICO-EMPIRICAL ANALYSES OF ATMOSPHERIC DIFFUSION THEORIES. *J. Atmospheric Sci., 32(9):1794-1807, Sept. 1975. 20 refs.*

Numerico-empirical expressions for the particle displacement probability density function from which the mean concentration of material in turbulent fluid may be obtained are derived from the numerical planetary boundary layer model of Deardorff. These expressions are used to compute profiles of the mean, cross wind-integrated concentration of an inert pollutant issuing from a continuous point source below a stable layer. Profiles are derived for each of two conditions of atmospheric stability: zi/L equals O and -4.5, where zi is the inversion base height and L and Monin-Obukhov length. The validity of the atmospheric diffusion equation is assessed by determining for each of the two stabilities the profile of vertical eddy diffusion that produces the closest fit of the mean concentration predicted by the atmospheric diffusion equation with the numerico-empirical (NE) profiles. Comparisons are made between the NE profiles and the corresponding concentration distributions predicted by the Gaussian plume formula with Pasquill-Gifford dispersion parameters, and the Gaussian puff equation with McElroy Pooler travel time dependent dispersion parameters. (Author abstract modified)

55169 **APTIC NO. 77284**

Leibrecht, Robert J. and H. C. Perkins

AN URBAN AIRSHED MODEL FOR PREDICTING CARBON MONOXIDE CONCENTRATIONS IN TUCSON, ARIZONA. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1975. 15 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-14.5.)*

A multi-box urban airshed model for predicting carbon monoxide concentrations in Tucson, Arizona is described. The predictive model applies conservation of mass to a grid of boxes accounting for the mechanisms of advection and diffusion, the sources of carbon monoxide, and the change of storage of mass, all as functions of time. A numerical solution is obtained for the carbon monoxide concentration as a function of time by assuming uniform mixing up to the mixing height. The mixing height, wind speed, wind direction, and source strength are the time dependent input parameters. A pseudo three dimensional dependency is obtained by assuming a logarithmic distribution in the vertical direction. The model is useful for predicting carbon monoxide concentrations under any meteorological conditions in areas of low to moderate traffic density. A Gaussian line source model can be used if prediction of carbon monoxide levels is needed in high traffic density areas. (Author abstract modified)

55170 **APTIC NO. 79322**

Lubkin, Gloria B.

FLUOROCARBONS AND THE STRATOSPHERE. *Phys. Today, 28(10):34-39, Oct. 1975. 12 refs.*

The tropospheric and stratospheric effect of fluorocarbons released into the atmosphere are discussed. Fluorocarbons released into ambient air diffuse very slowly into the stratosphere where they are decomposed by ultraviolet radiation from the sun. Once the fluorocarbon is dissociated by ultraviolet radiation into free chlorine and the fluorocarbon radical, the chlorine atom acts as a catalyst to remove ozone. Each Cl atom is capable of reaction with 10,000 O3 molecules, before forming less reactive hydrogen chloride, which then would diffuse downward to the troposphere. Fluorocarbons in the troposphere block outgoing infrared radiation, thus causing a greenhouse effect, and raising the earth s temperature.

55171 **APTIC NO. 79092**

Lukey, Michael F. and J. Kenneth Allison

APMAX - A COMPUTER PROGRAM DESIGNED TO ESTIMATE SHORT-TERM CONCENTRATIONS OF AIR CONTAMINANTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 1 ref. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-26.8.)*

A computer model designed to estimate the short-term groundline concentrations of inert air pollutants from multiple point sources is described. The model calculates the maximum concentration and its location coordinates for each of 576 combinations of wind speed class, wind direction, and stability class. The model can accept a total of 99 sources as input, using either the Briggs or Holland plume rise formula. The study area is defined by 441 receptor locations on a rectangular grid for each computer run, and the maximum concentration and location can be found to any degree of accuracy by decreasing the receptor grid interval on successive runs. Although the classical Gaussian model estimates 10- to 15-minute concentrations, the probability of occurrence of maximum pollutant concentrations can be estimated by knowing the meteorological conditions which result in the maximum and examining the frequency of occurrence of these conditions. The model has been used to estimate the maximum half-hour, 1hhour, 3-hour, 5-hour, 8-hour, and 24-hour concentrations of sulfur dioxide, particulate matter, hydrocarbons, carbon monoxide, hydrogen sulfide, and nitrogen oxides. (Author abstract modified)

55172 **APTIC NO. 79364**

Lyons, T. J. and D. R. Cutten

ATMOSPHERIC POLLUTANT AND TEMPERATURE TRAVERSES IN AN URBAN AREA. *Atmos. Environ., 9(8):731-737, Aug. 1975. 11 refs. (Presented at the Canadian Meteorological Society, Annual Congress, 8th, Toronto, Ontario, May 29-31, 1974.)*

The spatial and temporal variation of particulate matter and air temperature was investigated over the inner Adelaide (South Australia) area. The variability of the direction of light winds affects the dispersion of particulate matter. All of the temperature records illustrate the development of a distinct heat island within the city area whereas the absence of visibility minima are due to the width of the city streets. There is an increase in the visibility as the traffic decreases at night and a subsequent decrease in the visibility as the morning rush period starts. Higher values of visibility are observed in residential areas than in industrial areas. (Author abstract modified)

55173 **APTIC NO. 77062**

Matsuzaki, T., M. Udo, and M. Ohkohchi

A COMPUTER SYSTEMS APPROACH TO THE PREDICTION AND CONTROL OF AIR POLLUTION. *(Computer ni yoru taiki osen no yosoku to seigyo no tame no system). Text in Japanese. Air Pollution Control By Computers, Spec. Meet. Proc., Okayama, Japan, 1975, p. 15-29. 12 refs. (July 5.)*

An analog computer was used for the simulation of a continuous system. A digital computer requires special language, such as the continuous system modeling program graphics (CSMP graphics), to perform the same function. A block diagram is first prepared on a graphic display. Symbols for integrator, adder, multiplier, accumulating adder, function generator, random number generator, sampler and constant number factors are arranged at the lower-left hand corner of the diagram. The block diagram of a continuous system is made on cathode ray tube display by moving the symbols with a light pen. Parameters relating to the factors and the characteristics of the random numbers can be defined by imput with an alphanumeric keyboard. The result of simulation is plotted on the diagram by setting up coordinate axes. Alterations of the block diagram and parameters can be done after examinations. Non-linear factors and intrinsic functions can be arbitrarily made in the above system. The conversation-type simulation system requires the use of iso-concentration curve, indications of maximum concentrations and the locations, data on pollution levels, modifications of diffusion calculations due to alterations in operation and meteorological conditions, and examination and modification of pollution source information.

55174 **APTIC NO. 79514**

Mikolajczuk, Ewa and Zbigniew Sorbjan

METEOROLOGICAL AIR POLLUTION FORECAST BY THE CLASSIFICATION METHOD. *(Meteorologiczna prognoza stanu zanieczyszacenia powietrza atmosferycznego metode klasyfikacji). Text in Polish. Ochrona Powietrza (Warsaw), no. 3:69-72, 1975. 12 refs.*

A complete examination of all meteorological elements determining a certain kind of weather and its effect on the formation of pollution allows systematic protection and counteraction against high levels of air pollution. Statistical data evaluation can be used to forecast pollution intensity. The following mesoscale factors were proven significant for the purpose of prognostication: ventilation indices; wind velocity and direction; thermal balance, expressed, e.g., by the characteristic Length L (Monin-Obuchov); wind temperature with a calculated mean value for a given region; temperature difference between urban and suburban areas; occurrence of overcasts, fogs, and precipitation characterized by their extent and intensity. For instance, a rain with 1 mm of precipitation within 15 min washes out of the air 28% of dust particles 10 micrometers in size. Long-lasting rains increase air purity. The difficulties of realizing a program of statistical pollution projection are related to the changes of the spatial structure of the emission sources and their power. They can be overcome, however, by applying more effective systems.

55175 **APTIC NO. 77092**

Moore, David J. and Alan G. Robins

A COMPARISON BETWEEN CALCULATED AND OBSERVED FULL SCALE AND MODEL GAS TURBINE PLUME TRAJECTORIES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 14 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-49.4.)*

A gas turbine plume trajectory model that demonstrates the dependence of plume motion on the initial fluxes of buoyancy and momentum from the stack is described. The essential feature of the theory is the assumption that the plume breaks down into discrete puffs which slowly recombine as they drift downwind. A comparison of the theoretical predictions with data obtained from a 1/300 scale study of plume motion in a suburban environment and lidar investigations of the plume from a power station demonstrates that the theoretical model gives a good representation of the rise of model and full-scale gas turbine plumes if one of the parameters appearing in the trajectory equation is made a function of the surface roughness length. More experimental studies are required to accurately define this function. (Author abstract modified)

55176 **APTIC NO. 79540**

Munn, R. E.

SUSPENDED PARTICULATE CONCENTRATIONS: SPATIAL CORRELATIONS IN THE DETROIT-WINDSOR AREA. *Tellus (Uppsala), 27(4):397-405, 1975. 9 refs.*

Spatial correlation coefficients are computed and isopleths plotted for 24-hour suspended particulate concentrations in the Detroit-Windsor area. During a 14-month period in 1967-1968, particulate concentrations were measured every third day at 56 stations in the Windsor-Detroit, Sarnia-Port Huron region. The correlations are low when using the entire data set. The correlation coefficients are increased when the data are divided into subsets each with similar wind direction patterns. On individual days, the particulate levels measured at a single site are not useful indicators of urban particulate loadings unless the meteorological situation is specified. Implications for optimizing the density of air pollution networks are discussed. (Author abstract modified)

55177 **APTIC NO. 77099**

Murphy, Brian L.

PLUME RISE FROM A ROW OF CHIMNEYS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 3 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-04.7.)*

Plume rise from a row of chimneys is modeled in terms of equivalent single point and line sources. Each stage of the rise is modeled by an equivalent source with the height of the source chosen such that the height of rise and its partial derivative with respect to the downwind distance are continuous functions of the downwind distance. Results are derived for momentumless plumes in a stable atmosphere with the wind nearly perpendicular to the stack line and are compared with results previously derived by Briggs based on TVA data. Implementation of the method for (1) multiple plume rise under low wind conditions and (2) multiple plume rise when the wind blows nearly parallel the stack are also discussed, although specific results are not given.

55178 **APTIC NO. 79450**

Nkemdirim, Lawrence C., Gerald R. Lunn, and Richard D. Rowe

POLLUTANT CONCENTRATION AND STRATIFICATION IN URBAN HEAT ISLAND. *Water, Air, Soil Pollut., 4(1):99-112, March 1975. 13 refs.*

Diurnal variations in oxidant level and coefficient of haze for the Calgary urban heat island were correlated with changes in atmospheric stability and surface activity. Profiles of COH showed that an elevated plume existed in the city during 60% of the summer-fall transition period. Cold air drainage contributed substantially to the high frequency of elevated plumes observed during times of inversion. An observed discontinuity in the COH-temperature relationship was partially explained by chinook effects and ice crystallization. (Author abstract modified)

55179 **APTIC NO. 77005**

Okamoto, Shinichi, Kiyoshige Shiozawa, and Atsushi Otaki

SIMULATION OF ATMOSPHERIC POLLUTION BY THE DIFFUSION MODEL. III. *(Kakusan model ni yoru taiki osen simulation. III.). Text in Japanese. Preprint, Japan Meteorological Society, Tokyo, p. 56, 1975. (Presented at the Japan Meteorological Society Spring Meeting, Tokyo, Japan, May 21-23, 1975.)*

A diffusion model was revised to account for the geological distribution of the wind system; and by the Buff model thus obtained, the sulfur dioxide concentration in the Tokyo-Yokohama area was calculated. The diffusion breadth was determined by the approximation of Roberts, using the stability conditions at the time of the calculation. The change in the concentration of pollutants after the discharge was also calculated. When the actual concentration was low, especially when the concentration was lower than 5 pphm, the theoretical values were usually less than the experimental values. The time of appearance of peaks calculated from the equation agreed well with experimental observations. Hourly data obtained on March 25, 1969 were compared with the theoretical value; the measurements were made at Kojiya, Chuo, Daishi, and Tajima.

55180 **APTIC NO. 79374**

Ozaki, M. and F. Funabashi

PROBLEMS ON THE DIFFUSION CALCULATION BY COMPUTER. *(Keisanki ni yoru kakusan keisan ni atatteno mondaiten). Text in Japanese. Kankyo Gijutsu (Environ. Conserv. Eng.), 4(9):660-664, 1975. 4 refs.*

The diffusion calculation method adopted in the total emission quantity control law is reviewed. Steps involved in diffusion calculation by computer are (1) establishment of the target, involving determination of the aerial ranges of emissions based on source data and environmental data (meteorological and pollution data), (2) compiling and sorting data (3) determination of macro-structure (block division method), and (4) determination of detailed structure. Problems involved in calculation steps are attributable to the characteristics of the object, which include the distribution characteristics; uncertainty of the understanding of the object; multiplicity in the object s structure, involving many and complex factors; large volume of the data to be processed; and social factors involving the human element. Problems in compiling and sorting data and determination of macro-structure and detailed structure are discussed.

55181 **APTIC NO. 77210**

Paterson, M. P. and S. F. Benjamin

BETTER THAN A WIND ROSE. *Atmos. Environ., 9(5):537-542, May 1975.*

A form of presenting wind data which is superior to the traditional wind rose for many purposes is described. A single diagram conveys detailed information on the speed and direction of major wind systems and allows the diurnal variation to be interpreted in terms of the physical processes which produce the winds. The diagram is easily constructed from the separate hours wind frequency analysis which is available from the Meteorological Office for surface wind observations at many sites in the United Kingdom. Information on the comparable winds aloft can be compiled from daily rawinsonde data. This form of wind analysis provides a much more complete picture of the wind systems than is given by wind roses and reveals some characteristics of the winds of England which are not apparent in other published analyses. It is possible to build up a three dimensional picture of the major wind systems by considering a number of stations. The stability of the lower atmosphere, a useful factor in pollution studies, can be deduced at the same time by identifying the diurnal variation of the systems. A notable slowing of the westerlies on traversing England brings into question the use of geostrophic wind trajectories at 850 millibar in tracking long-range air pollution drift. (Author abstract modified)

55182 **APTIC NO. 79563**

Pearson, C. R. and G. McConnell

CHLORINATED CL AND C2 HYDROCARBONS IN THE MARINE ENVIRONMENT. *Proc. Roy. Soc. London, Ser. B, 189(1096):305-332, May 20, 1975. 39 refs.*

The distribution of chlorinated carbon 1 and C2 hydrocarbons including chloroform, carbon tetrachloride, trichloroethylene, perchloroethylene, and trichloroethane, in the environment is discussed. There is wide distribution of these compounds in the atmosphere and hydrosphere due to aerial transport. There is no evidence for the bioaccumulation of C1/C2 compounds in food chains and the maximum concentrations found in the higher trophic levels are only parts per 10 to the 8th power by mass. The rates of breakdown in the hydrosphere are slow, while transfer to the atmosphere followed by photooxidation leads to environmental half-lives measured in weeks. (Author conclusions modified)

55183 **APTIC NO. 77276**

Rao, K. S., J. S. Lague, and B. A. Egan

A DYNAMIC PLUME MODEL FOR THE PREDICTION OF ATMOSPHERIC EFFECTS ASSOCIATED WITH COOLING TOWER OPERATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-04.5.)*

A numerical method for predicting the convective rise of cumulus clouds in a quiescent atmosphere is adapted to model the behavior of a buoyant moist cooling tower plume released at high vertical velocity into a crosswind. The model is successfully applied to assess the atmospheric effects (ground-level icing, fogging, and visible plume length) associated with a number of cooling tower designs. A physically-realistic procedure for treating the merging of multiple plumes is incorporated for application to mechanical draft towers. The computational scheme is based on numerical methods for obtaining simultaneous solutions to a system of differential equations expressing conservation of mass, total moisture, momentum, and entropy, as well as a series of equations for handling water phase conversions. Assuming a top-hat similarity distribution of properties, the rise, growth rate, velocity, temperature, and liquid mixing ratio of the plume are calculated at various downwind distances. Vertical profiles of atmospheric temperature, wind, and specific humidity may be used as inputs where data from meteorological towers are available. (Author abstract modified)

55184 **APTIC NO. 79564**

Ramussen, Karen H., Mansoor Taheri, and Robert L. Kabel

GLOBAL EMISSIONS AND NATURAL PROCESSES FOR REMOVAL OF GASEOUS POLLUTANTS. *Water, Air, Soil Pollut., 4(1):33-64, March 1975. 149 refs.*

The various sources and natural sinks of gaseous pollutants are reviewed. The removal mechanisms include absorption by vegetation, soil, stone, and water bodies, precipitation scavenging, and chemical reactions within the atmosphere. The nature and magnitude of anthropogenic and natural emissions of the gases hydrogen sulfide, sulfur dioxide, nitric oxide, nitrous oxide, nitrogen dioxide, ammonia, carbon monoxide, ozone, and hydrocarbons, along with their ambient concentrations and information on their major sinks identified to date, are discussed. (Author abstract modified)

55185 **APTIC NO. 79327**

Rebours, B. and P. Rabache

SYNTHETIC TRANSMISSION SPECTRA IN THE FAR INFRARED FOR THE LOW STRATOSPHERE. *Infrared Phys., 15(3):189-199, Sept. 1975. 5 refs.*

A method for theoretical analysis of spectral transmission, applied to the lower stratosphere in the far infrared is described. The results are presented as synthetic spectra of high resolution (0.01/cm). Transmission of water and ozone is calculated between 10 and 200/cm and discussed with respect to the aiming angle and observation altitude. A comparative study of water, oxygen, and O3 transmission is provided and compared with the measurements for the portion of the spectrum between 50 and 74/cm. The method is applicable to other minor constituents of the atmsophere in different observation conditions. (Author abstract modified)

55186 **APTIC NO. 79143**

Reiter, Elmar R.

DIFFUSION OF POLLUTANTS IN AN URBAN ENVIRONMENT. UTILIZATION OF LARPP DATA. *Preprint, Colorado State Univ., Fort Collins, 42p., Jan. 31, 1975. 17 refs.*

Analytical techniques associated with studying the diffusion of pollutants in an urban environment are discussed, with particular reference to utilizing data obtained from the Los Angeles Reactive Pollutant Program (LARPP). Topics discussed include: the Eulerian and Lagrangian Approaches to the turbulent diffusion of pollutants, conversions between Eulerian and Lagrangian coordinate systems, and numerical modeling approaches to pollution transport. Particular emphasis is placed on the following two modeling approaches: the construction of trajectories for characteristic air parcels along with estimates of pollution dispersion along these trajectories and the computation of advective and diffusive properties of the planetary boundary layer at fixed grid points. The first approach is well suited for data input obtained from a Lagrangian coordinate system, while the second approach relies on an Eulerian coordinate system.

55187 **APTIC NO. 79315**

Rigaud, Pierre, Otto Steiger, and Daniel Huguenin

DESTRUCTION OF OZONE IN THE STRATOSPHERE BY OXIDES OF NITROGEN AT SUNRISE. *(Destruction de l ozone de la haute atmosphere par les oxydes d azote au moment du lever du soleil). Text in French. C. R. Seances Soc. Phys. Hist. Nat. Geneve, 9(1-3):84-90, March 1975. 8 refs.*

The destruction of ozone in the stratosphere by oxides of nitrogen at sunrise was investigated. The results confirm earlier measurements and their significance was evaluated. The importance of the cycle of O3 destruction by NOx is of great significance because of the successive arrival of the different wavelengths of solar radiation.

55188 **APTIC NO. 79490**

Sawyer, J. S.

SOME ASPECTS OF AIR POLLUTION ON A GLOBAL AND CONTINENTAL SCALE. *Clean Air, 5(13):12-18, Autumn, 1975. 10 refs.*

The meteorological background of some ideas on long term accumulations of pollutants are discussed. Long range transport is discussed. Washout is an important factor in controlling the distribution of pollutants. There is apparently a sink for carbon monoxide in the stratosphere. There is probably a biological source of CO in the surface layers of the ocean. Changes in the carbon dioxide concentration have a potential to change the heat balance of the earth. The possible effects of pollution in the stratosphere from supersonic aircraft, the exhausts of rockets, and freons are discussed. Effects of air pollution on climate are included. The only clearly detectable effects so far of atmospheric pollution on weather and climate have been local and close to the source. Numerical simulations of climate into which the physical effects of pollutants have been incorporated are necessary for proper assessment of human effects on climate.

55189 **APTIC NO. 79393**

Schulze, R. and F. Kasten

INFLUENCE OF THE ATMOSPHERIC OZONE LAYER ON BIOLOGICALLY ACTIVE ULTRAVIOLET RADIATION AT EARTH S SURFACE. *(Dier Einfluss der Ozonschicht der Atmosphaere auf die biologisch wirksame Ultraviolettstrahlung an der Erdoberflaeche). Text in German. Strahlentherapie (Munich), 150(2):219-226, Aug. 1975. 5 refs.*

The biologically active ultraviolet radiation at earth s surface was calculated as a function of the sun s altitude and atmospheric ozone content in biological units: BU equals mWh/sq cm times erythema efficacy. The total daily, monthly, and yearly amounts of biologically active ultraviolet radiation are determined for the different geographical latitudes and various ozone contents. Approximately two thirds of the BU hit the equatorial zone from 35 deg south to 35 deg north. Provided that the stratospheric O3 layer would be reduced by 10% from the exhaust gases of supersonic planes flying at high altitude, an increase of BU would result amounting to 18% at the equator, to 19% in middle latitudes, and to 22% at the poles.

55190 **APTIC NO. 77275**

Shiozawa, Kiyoshiga and Shin Ichi Okamoto

A DIFFUSION MODEL FOR AIR QUALITY SIMULATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 17 refs. (Presented at the Air Pollution Control Association, Annual, Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-04.4.)*

A diffusion model for air quality simulation under unstable weather conditions is presented. The smoke plume from a source is considered as a string of many short plume pieces which have finite length due to the piecewise constant emission. The procedure for tracing the smoke trajectory is the same Lagrangian method as for the puff model, but the plume equation is used in the concentration calculation. The crosswind distance is calculated as the minimum distance from the receptor to each point of the plume piece, and the downwind distance is considered as the length along the trafectory of the plume piece. Application of the model to the calculation of sulfur dioxide concentration in the Kiehin District reveals good agreement between model calculations and observed data. (Author abstract modified)

55191 **APTIC NO. 77255**

Takano, Kenji

VARIATION OF URBAN ATMOSPHERIC ENVIRONMENT CAUSED BY HUMAN ACTIVITIES: STUDIES BY THREE DIMENSIONAL NUMERICAL MODEL. *(Ningen katsudo ni yoru toshi taiki kankyo no henka -- 3 jigen suchi model ni yoru kenkyu). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

A numerical model was developed for the prediction of urban environment. The model is three-dimensional and correctly expresses the ventilation effect on the horizontal surface. It can introduce wind and atmospheric temperature structures as external conditions. It can also introduce the effects of the city locations such as the effects of sea and the shape and form of the city. The energy-balance equation for the determination of atmospheric temperature and kinetic equations were solved. The model was tested for its stability by giving a simple condition. A square city was placed at the center of the model atmosphere and excess heat was supplied to the square only. The formation of a warm mass above the city and the circulation in the surroundings due to temperature difference were investigated. At heat intensity of 0.2 cal/sq cm-min, a heat mass of 500 m in thickness was formed around the city. The temperature above the city center instead was low, possibly because of forced ascending current due to circulation. The result showed good agreement with the experimentally observed results.

55192 **APTIC NO. 79568**

Takashima, Tsutomu

EFFECT OF AEROSOLS ON A REFLECTED RADIATION IN THE INHOMOGENEOUS OZONE ATMOSPHERE CALCULATED BY USING THE ADDING METHOD. *J. Meteorol. Soc. (Japan), 53(2):161-167, April 1975. 12 refs.*

The effect of aerosols on a reflected radiation in the inhomogeneous ozone atmosphere was calculated by using the adding method. Aerosols affect the diffuse reflection radiation very much. The intensity ratio increases in the presence of aerosols more at lambda equals 0.34 micron (up to 20%) than at lambda equals 0.30 micron (at most 10%) in comparison with that of Rayleigh and ozone mixed atmosphere. The refractive index is an important parameter for the diffusely reflected radiation. The inhomogeneous vertical distribution of the atmospheric aerosols must be taken into account when determining the amount of O3 by using the data taken by satellites in the region of lambda equals 0.30 and 0.34 micron. (Author conclusions modified)

55193 **APTIC NO. 77011**

Volz, F. E.

DISTRIBUTION OF TURBIDITY AFTER THE 1912 KATMAI ERUPTION IN ALASKA. *J. Geophys. Res., 80(18):2643-2648, June 20, 1975. 52 refs.*

An analysis of turbidity data on the distribution and removal of aerosol injected into the stratosphere by the Katmai volcanic eruption in Alaska on June 6, 1912 is presented. Turbidity was determined from solar radiation data obtained mainly in central and northern Europe and the United States. Volcanic turbidity in Europe was quite large but highly variable during the summer of 1912 and became rather low in February of 1913 when it was still high over the United States. The marginal evidence for the existence of Katmai dust over Mexico City suggested that transient increases of turbidity over Peru were not associated with Katmai dust; a more likely source of the Peruvian turbidity was some unreported eruption from a volcano in the Andean cordillera. The average residence time of the Katmai dust was nearly 1 yr. (Author abstract modified)

55194 **APTIC NO. 79198**

Weisman, Boris and M. S. Hirt

DISPERSION GOVERNED BY THE THERMAL INTERNAL BOUNDARY LAYER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-26.3.)*

A model for determining pollutant concentrations under dispersion conditions caused by a lake-induced thermal internal boundary layer is applied to the case of multiple sources at varying distances from the shoreline. A comparison of model calculations with experimental data obtained during a survey of a large power station on the northern shore of Lake Ontario reveals good agreement. A method is also developed for using synoptic-type meteorological data to obtain statistical information on the occurrence of lake-induced thermal internal boundary layers during the summer season. The possibility of empirically describing the thermal internal boundary layer in terms of synoptic variables allows for the estimation of effects resulting from locating power generating stations near the shore of a large lake. (Author abstract modified)

55195 **APTIC NO. 77012**

Wuebbles, Donald J. and Julius S. Chang

SENSITIVITY OF TIME-VARYING PARAMETERS IN STRATOSPHERIC MODELING. *J. Geophys. Res., 80(18):2637-2642, June 20, 1975. 25 refs.*

The sensitivity of time-varying parameters such as seasonal and diurnal changes in the solar zenith angle in relation to minor chemical species and their perturbations in a time-dependent one-dimensional model of the stratosphere is analyzed, with particular emphasis on the modeling of pollution from supersonic transport aircraft. A total of 14 minor atmospheric constituents are solved for in the model and include several oxides of nitrogen, ozone, nitric acid, atomic hydrogen and nitrogen hydroxyl radical, and hydrogen peroxide. Correlation factors for the effects of seasonal and diurnal variations in the solar zenith angle are both small and opposite in sign for SST perturbation of ozone, suggesting the net global effect to be small. However, the detailed trace constituent distributions are seriously affected by these time-dependent variations, indicating that care must be taken in comparing local measurements of trace constituents with theoretical calculations.

55196 **APTIC NO. 79377**

Yamazaki, Y.

ON THE DEGREE OF PHOTOCHEMICAL SMOG PROBLEMS. *(Kokagaku sumogu wa dokomade kaimei saretaka). Text in Japanese. Gijutsu to Ningen (Tech. Hum. Being), 4(9):48-5, Sept. 1975.*

An incident occurring on June 28, 1970 in the Kisaratsu area in Chiba involving about 6000 victims (irritation of eyes and throat, chest pain) was the first case labeled as photochemical smog affliction. The present status of the study on causes of photochemical smog affliction is discussed, with a review of the oxidant and sulfuric acid mist theory, hydrogen chloride and carbon monoxide theory, hydrogen cyanide theory, methyl nitrate and acrolein theory, Ox theory, hydrogen sulfide theory, chloroform theory and nitrobenzene and nitrophenol theory and with case studies of representative episodes of photochemical smog affliction. Reasons for confusion and stalemate in the study on photochemical smog affliction include the attitude of administrative branches ignoring the smog affliction and the limits of present technology.

55197 **APTIC NO. 76972**

Kanagawa Prefectural Government (Japan) Environmental Pollution Control Office

STATUS ON PHOTOCHEMICAL POLLUTION. *(Kokagaku kogai no hassei jokyo). Text in Japanese. Kokagaku Kogai no Genjo to Taisaku (Present Situation Countermeasure Photochem. Pollut.), vol. 1975:1-31, April 1975.*

Data concerning the photochemical smog pollution in Kanagawa Prefecture for 1974 compiled and analyzed include the number of warnings issued, time, area involved, and maximum oxidant concentration (0.09-0.32 ppm) with reference to data of preceding years and of other parts of Japan, diurnal variations of oxidants and nitrogen oxides concentrations on days when warnings were issued, and meteorological factors such as weather, temperature, visibility, wind direction and velocity, atmospheric stability, local wind pattern and weather map. Meteorological data are analyzed in relation to high oxidant concentration and characteristic meteorological conditions associated with high oxidant concentration are described. Data of oxidant concentration during the period of April to Oct. 1974 are also compiled and analyzed (the maximum average concentrations of the entire period (ppm) were 0.042 at Chigasaki, 0.040 at Yokosuka, Kamakura and Yamato, and the minimum average concentration was 0.026 ppm at Odawara).

55198

APTIC NO. 76979

Kanagawa Prefectural Government (Japan), Environmental Pollution Control Office

OCCURRENCES AND COUNTERMEASURES FOR WET-TYPE AIR POLLUTION, ACID RAIN. *(Shissei taiki osen, iwayuru sansei ame, no hassei jyokyo to taisaku). Text in Japanese. Kogakaku kogai no genjo to taisaku (Photochem. Pollut. Countermeasure), vol. 1975: 100-107, April 1975.*

Acid rain on July 4, 1974 caused eye irritation in the Kanagawa Prefecture. The meteorological conditions, the number of areas reporting injuries, and countermeasures are discussed. Eye irritation was reported from areas in the prefecture, as far as 10 to 20 km from thee coastal industrial area. The rain had a pH 3 to 4 compared to the average rain pH of 4 to 6. However, the concentrations of sulfur, chloride, and nitrate ions in the rain were not significantly higher than those found in the average rain. The meteorological factors that produced acid rain were temperature, humidity, wind velocity, wind direction, atmospheric pressure distributions, and atmospheric layers. The forecast for acid rain in the Kanagawa Prefecture is to be announced when all of the following conditions are present: the presence of a weak warm frontal line within 100 km, a northeasterly wind of less than 4 m/sec, a low air pollution index at 3 pm which dropped from a high value the day before misty of rainy weather, low temperature, the presence of an isothermal or inversion layer above a 200 m altitude, and a humidity of 85% to 95%.

55199

APTIC NO. 79477

Saitama Prefecture Public Nuisance Research Center

THREE DEMENSIONAL INVESTIGATION REPORTS ON THE PHOTOCHEMICAL SMOG. *(Kokagaku sumogu koiki rittai chosa hikokusho). Text in Japanese. 156p., March 1975.*

Measurements of air pollutant concentrations were carried out in Saitama prefecture from July 10 to August 24, 1974. Air was sampled using a helicopter by fixing a sampling tube to the front tip of the skid. The helicopter climbed to an altitude of 1500 m in a spiral climb at 200 m/min and then descended at the same velocity. Air at the same altitude was sampled twice, once during the ascent and once during the descent. Ozone and nitrogen oxides were analyzed by chemiluminescence method, carbon monoxide by electrochemical method and hydrocarbons by gas chromatography with flame ionization detector. Results showed that considerable difference in ozone concentration was observed between 300 m and 1000 m in the eastern prefecture. The ozone concentration below in inversion layer or the stablized layer increased remarkably with increasing time during the day. The concentration in the upper layer began to increase after the photochemical reaction was over. Significant difference in the vertical distribution of the ozone concentration was observed between the upstream region and the downstream region. High ozone concentrations were found north of Omiya city an low concentration was found at Kawaguchi city. Results of hydrocarbon analysis revealed that the photochemical reaction in the area during the investigation time was generally insignificant.

55200

APTIC NO. 7916

Angell, J. K., C. R. Dickson, and W. H. Hoecker, Jr.

RELATIVE DISPERSION WITHIN THE LOS ANGELES BASIN AS ESTIMATED FROM TETROON TRIADS. *National Oceanic And Atmospheric Administration, Silver Spring, Md., Air Resources Lab., NOAA Technical Memorandum ERL ARL-46, 34p., Nov. 1974. 7 refs.*

NTIS: COM75-10197

The Los Angeles Reactive Pollutant Project involved volumes of air tagged by means of three constant volume balloons (tetroons) released similtaneously from the same point on the ground. The variation of lateral and longitudinal standard deviation of tetroon position with travel time and distance is considered, based on radar tracking of 35 tetroon triads at a mean height 350 m above sea level. The median lateral standard deviation varies, on the average, from 90 m after 15 min to 800 m after 120 min, and from 140 m at 2 km to 1000 m at 20 km, but there is more than a factor of two difference associated with gross divisions according to time of day, atmospheric stability, and turbulence intensity. Relative dispersion is estimated from the spreading of the three tetroons making up each triad. As expected, interaction with the sea breeze front increases the dispersion by at least a factor of two, but there is evidence of horizontal convergence prior to the sea breeze reversal. The rate of dispersion is compared with that obtained from bulk tracer experiments in other locations. The dispersion rate within the Basin is frequently anomalously small, particularly with respect to travel time. The tetroons may be underestimating the diffusion existing close to the ground in stable conditions. (Author abstract modified)

55201

APTIC NO. 79138

Anthes, Richard A. and Thomas T. Warner

PREDICTION OF MESOSCALE FLOWS OVER COMPLEX TERRAIN. *Army Electronics Command, White Sands Missile Range, N. Mex., Atmospheric Sciences Lab., Army Task 1T161102B53A-17-42, Rept. ECOM-5532, OSD-1366, 112p., March 1974. 9 refs.*

A numerical method for the analysis of atmospheric flows with a spatial resolution of a few kilometers is presented for short-range predictions on the order of a few hours. Equations of motion are written in generalized sigma (relative pressure) coordinates with provision for a variable number of levels and a variable top pressure surface. Two-dimensional experiments over very rough terrain covering a domain of almost 150 by 150 km show that inadequate vertical resolution produces the greatest error in the upper trosphere. At least 14 layers appear necessary for the case of vertically propagating gravity waves in stable flow over mountain barriers. Other sources of error are a low upper model surface, proximity of lateral boundaries to steep terrain, and unsmoothed terrain elevations. Qualitatively reasonable solutions can be obtained with three-dimensional models, though the computational problems are much greater.

55202

APTIC NO. 78984

Artemova, N. E.

CALCULATION AND PREDICTION OF RADIOACTIVE CONTAMINATION OF THE LOWER ATMOSPHERE BY ATOMIC POWER STATION STACK DISCHARGES. *Soviet J. At. Energy (English translation from Russian of: Atom. Energ.), 36(1):33-38, Jan. 1974. 10 refs.*

Methods of calculation and prediction of radioactive contamination of the lower atmosphere by atomic power station stack discharges are discussed. There are two groups of techniques based on two different approaches to the description of atmospheric diffusion: statistical and semiempirical using analogy with molecular diffusion. The statistical theory is based on the study of fluctuations as a statistical ensemble and considers their influence on the nature of the entire field including the average flow. The semiempirical theory assumes the average flow to be steady state and studies its features and its influence on other properties. The use of one or the other method for calculations of surface layer contaminant concentration leads to identical results if the averaging period for the set of meteorological parameters used and the accuracy of each method is taken into account. The best agreement with experimental data is obtained with calculations of contaminant dispersion under averaged conditions.

55203 **APTIC NO. 79142**

Bennett, Charles

CLIMATE OF THE SAN DIEGO AIR BASIN. *California Air Resources Board, Sacramento, Div. of Technical Services, 21p., Dec. 1974. 19 refs.*

The San Diego Air Basin in California is described in terms of three fundamental elements of air pollution climatology: topography, general weather types, and ventilation characteristics. The basin lies in the extreme southwestern portion of California and is situated between Orange and Riverside Counties on the north and Mexico on the south and between the peninsular range on the east and the Pacific Ocean on the west. The weather is strongly influenced by the Pacific Ocean and its simi-permanent pressure systems which produce wet winters and dry summers. Wind speeds are generally light to moderate. Inversion conditions occur frequently in the basin. The high incidence of weak nighttime surface winds along some coastal areas is conducive to the accumulation of pollutants there. These pollutants are carried inland by the daytime sea breeze. When this breeze fails to develop or remains weak during low inversion conditions, the result is high pollutant loading of the air layer near the surface. Atmospheric dispersion is strongest during the summer, especially during the afternoons.

55204 **APTIC NO. 79428**

Bertrand, J., J. Baudet, and A. Drochon

IMPORTANCE OF NATURAL AEROSOLS IN WEST AFRICA. *(Importance des aerosols naturels en Afrique de l ouest). Text in French. J. Rech. Atmospheriques, 8(3-4):845-860, July-Dec. 1974. 20 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

The importance of natural atmospheric aerosols in West Africa was investigated and forecast network observations were used to study a typical dust situation in March 1973. Studies of processes of cloud formation distinguish between two defined source areas: one, at the latitude of Sudan, Algeria, and Mauritania, from which dust is carried over the North Tropical Atlantic; and secondly, Tchad and North Nigeria, from which dust spreads over the African continent south of the Sahara. Contours of isovisibility display the dry haze cloud progression over the continent. The patterns of these contours delineate of a horizontal spreading together with density evolutions of the dust cloud. A schematic vertical section of such clouds, based on various types of observations made by airplane pilots, is proposed. A relationship between visibility and mass concentration of dust was established from data collected at Abidjan. It allows the determination from optical visibility data of the lower limits of dust mass in suspension in the lower atmosphere, for a given situation. (Author abstract modified)

55205 **APTIC NO. 79060**

Cadle, R. D., E. F. Danielsen, A. L. Lazrus, B. G. Schuster, and J. P. Shedlovsky

RECENT STUDIES OF THE STRATOSPHERIC AEROSOL LAYER. *International Union of Geodesy and Geophysics, Paris (France), International Assoc. of Meteorology and Atmospheric Physics, Ontario (Canada), Australian Academy of Sciences, and Dept. of Transportation, Washington, D. C., Int. Conf. Struct., Compos. Gen. Circ. Upper Lower Atmos. Possible Anthropogenic Perturbations, 1st, Melbourne, Australia, 1974, p. 161-173. 8 refs. (Jan. 14-25.)*

The stratospheric aerosol layer was studied with filters and impactors carried by aircraft and balloons and with lidar. Previous results indicating that impactors of the type used in the late 1950 s and early 1960 s had about 20% of the collection efficiency of polystyrene fiber filters used for the stratospheric sulfuric acid particles were confirmed. The impactors and filters collect ammonium sulfate with about equal efficiency. Calculations based on gas kinetic theory demonstrate that the possibility of important heterogeneous chemical reactions occurring in the stratosphere should not be overlooked. Analyses of the water soluble particles in volcanic eruption fume indicate that the impure sulfuric acid particles in the stratosphere contain a large number of metal cations that can enhance the catalytic activity. Lidar measurements suggest a recent strong enhancement of the stratospheric aerosol in the north polar region, possibly the result of injections of particles from a volcanic eruption in Iceland. Analyses of stratospheric particulate material collected along a meridian from 75 degrees north to 51 degrees south show that the mixing ratios of all the substances studied are such that their isopleths tend to parallel the tropopause height. (Author abstract modified)

55206 **APTIC NO. 79108**

Changnon, Stanley A., Jr.

AGRICULTURAL AND WATER RESOURCE IMPACTS FROM URBAN-INDUCED PRECIPITATION CHANGES. *Earth Environ. Resour. Conf. Digest Tech. Papers, vol. 1974:38-39, Sept. 1974.*

Economic and geophysic impacts of urban-induced precipitation changes in the St. Louis area on agricultural and water resources are estimated for the period 1951-1970. The net gain in crop production resulting from increased rainfall amounts to an average of $137/farm; this figure includes an average loss/farm of $75 due to increased hail occurrence. The urban-induced precipitation in the area is also responsible for increased groundwater pollution since 1950. The average warm season runoff in the Canteen Creek Basin appears to have increased by 15% since 1955.

55207 **APTIC NO. 79139**

Christiansen, John H. and Richard A. Porter

AMBIENT AIR QUALITY PREDICTIONS WITH THE FAST AIR QUALITY MODEL. *Texas Air Control Board, Austin, Data Processing Section and Meteorology Section, 42p., 1974 (?). 7 refs.*

The Fast Air Quality Model (FAQM) of the Texas Air Control Board is described. The model predicts urban air pollution with an accuracy that is comparable to that of the Climatological Dispersion Model of the Air Quality Display Model; however, the FAQM is approximately two orders of magnitude faster. Computer time is conserved by the use of a separate program which is run to solve the Gaussian plume equation for many combinations of effective source height and downwind distance in each stability class. The results are incorporated into the FAQM as a table of coefficients. The FAQM interpolates in the table instead of solving the Gaussian plume equation explicitly for each source- receptor configuration. Area source concentrations are determined using Hanna-Gifford area source logic whereby the pollutant concentration is proportional to the emission rate per unit area at the receptor divided by the surface wind speed. The FAQM can compute the concentrations of three pollutants at once, and five different sets of meteorological conditions and emissions data for a given area may be modeled in one run.

55208 **APTIC NO. 79141**

Gibson, John

CLIMATE OF THE NORTHEAST PLATEAU AIR BASIN. *California Air Resources Board, Sacramento, Div. of Technical Services, 21p., Nov. 1974. 12 refs.*

The Northeast Plateau Air Basin in California is described in terms of three fundamental elements of air pollution climatology: topography, general weather types, and ventilation characteristics. The basin can be divided into four topographic provinces: the Klamath Mountains in western Siskiyou County, the Cascade Range in Shasta and eastern Siskiyou Counties, the Modoc Plateau in western Modoc County and northern Lassen County, and the Great Basin Province in extreme northeastern Modoc County and southeastern Lassen County. The basin includes a wide diversity of climates. Winters are generally quite cold and moderately snowy, and summers are warm and dry. Neither weather nor topography in most parts of the basin is conducive to the development of considerable air stagnation. Terrain depressions where potential air pollution stagnation problems do exist include the Shasta and Scott Valleys in the central portion of the basin, the enclosed basins of Surprise Valley and Honey Lake Valley, and, to a lesser extent, Tulelake Basin and the intermontane valleys on the Modoc Plateau.

55209 **APTIC NO. 79544**

Gillette, Dale A.

ON THE PRODUCTION OF SOIL WIND EROSION AEROSOLS HAVING THE POTENTIAL FOR LONG RANGE TRANSPORT. *J. Rech. Atmospheriques, 8(3-4):735-744, July-Dec. 1974. 15 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

The production of soil wind erosion aerosols expressed as vertical flux of particulate matter was measured for several wind speeds on two soils of distinct textural types. Erosion conditions for the two soils such as soil moisture, surface roughness, cloudiness, and vegetative residue are very similar. The vertical fluxes of aerosols are described by the relationship vertical aerosol flux alpha (wind speed/threshold erosion wind speed) to the gamma power, where wind speed is greater than threshold wind speed and where gamma is greater than 3 and is larger for the soil having more silt content per unit mass. Increased disintegration of soil aggregates with increased sandblasting causes larger proportions of particles with greater than 10 micron in the injected particulates. Aggregates composed of fine particles yield more fine particles when they are disintegrated than aggregates having smaller proportions of fine particles. (Author abstract modified)

55210 **APTIC NO. 79047**

Hales, J., R. Beadle, R. Clements, W. Cotton, A. N. Dingle, J. Eaton, D. Gatz, H. Georgii, L. Granat, H. Harrison, J. Kramer, D. Matheson, J. Miller, E. Muller, R. Newell, P. Summers, G. Vali, H. Viebrock, and J. Wisniewski

PRECIPITATION CHEMISTRY. *Environmental Protection Agency, Washington, D. C., Div. of Meteorology and Atomic Energy Commission, Washington, D. C., Div. of Biomedical and Environmental Research, Chem. Meteorol. Workshop-1974, Ft. Lauderdale, Fla., 1974, p. 19-35. (Jan. 14-18.)*

Precipitation chemistry is discussed in terms of atmospheric purification, the delivery of pollutants and nutrients to the earth's surface, and weather modification. Specific topics covered include: reaction rate phenomena in precipitation associated with such compounds as alkyl sulfides, hydrogen sulfide, sulfur dioxide, ammonium ion, nitrates, alcohols, and aldehydes; the modeling of precipitation processes in the atmosphere; terrestrial responses to precipitation; precipitation analysis techniques; and field sampling network design. Estimates based on global budgets indicate that for pollutants that are well mixed in the troposphere precipitation scavenging accounts for about 80% of the overall removal rate.

55211 **APTIC NO. 79543**

Hoffman, Gerald L., Robert A. Duce, Paul R. Walsh, Eva J. Hoffman, Barbara J. Ray, and James L. Fasching

RESIDENCE TIME OF SOME PARTICULATE TRACE METALS IN THE OCEANIC SURFACE MICROLAYER: SIGNIFICANCE OF ATMOSPHERIC DEPOSITION. *J. Rech. Atmospheriques, 8(3-4):745-759, July-Dec. 1974. 24 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Atmospheric sea surface microlayer (top 100-300 micron) and subsurface (20 cm) concentrations of particulate iron, vanadium, and manganese were determined in samples collected on cruises between Barbados and Dakar, Dakar and Bermuda, and the Azores and Bermuda. The surface microlayer is enriched in these particulate trace metals relative to subsurface water in approximately 95% of the samples. High surface microlayer particulate Fe concentrations in areas near the coast of West Africa are associated with the high atmospheric Sahara dust loadings commonly found in this area. It is assumed the major input of particulate Fe to the surface microlayer in this region is from the atmosphere. The microlayer residence time of a particulate Fe is a few seconds under the 5-10 m/sec wind conditions encountered. In areas with lower, more normal, atmospheric particulate concentrations, it is likely that surface microlayer particulate trace metal enrichments are not due to direct atmospheric depositions but may result from some process in the sea itself. (Author abtract modified)

55212 **APTIC NO. 79542**

Johansson, T. B., R. E. Van Grieken, and J. W. Winchester

MARINE INFLUENCES ON AEROSOL COMPOSITION IN THE COASTAL ZONE. *J. Rech. Atmospheriques, 8(3-4):476-776, July-Dec. 1974. 14 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Biased data set averaging was used to examine aerosol elemental composition data for air mass directional effects. Samples collected in north Florida during spring and summer 1973 are influenced by local and remote continental sources and by maritime sources when air flow is southerly. Judgments of air movements during the collection of 32 5-stage cascade impactor samples are made by examination of daily surface weather maps, 3-hourly surface winds in Tallahassee, and semi-diurnal balloon soundings to 1524 meters. Averages of elemental abundances as a function of particle size, determined by proton induced X-ray emission (PIXE) are computed for a 14-sample set biased toward marine air flow conditions and for a 6-sample set biased toward continental air flow, excluding 12 additional samples where air flow characteristics are variable or periods of very low wind speed are experienced. By regarding iron to be of continental origin in all samples, qualitative indications of provenance are observed for sulfur, chlorine, potassium, calcium, titanium, vanadium, manganese, iron, copper, zinc, bromine, and lead. (Author abstract modified)

55213 **APTIC NO. 79059**

Junge, C.

SULFUR BUDGET OF THE STRATOSPHERIC AEROSOL LAYER. *International Union of Geodesy and Geophysics, Paris (France), International Assoc. of Meteorology and Atmospheric Physics, Ontario (Canada), Australian Academy of Sciences, and Dept. of Transportation, Washington, D. C.. Int. Conf. Struct., Compos. Gen. Circ. Upper Lower Atmos. Possible Anthropogenic Perturbations, 1st, Melbourne, Australia, 1974, p. 85-97. 29 refs. (Jan. 14-25.)*

Particles of the stratospheric aerosol layer consist, to a large degree, of sulfate. Gaseous sulfur constituents diffuse upward into the stratosphere and are converted into particulate matter by oxidation. These particles are subsequently removed again from the stratosphere by mixing and sedimentation so that the sulfur budget of the stratosphere is balanced. The concept of gas diffusion is tested by model calculations on the basis of the presently available knowledge. This concept can simulate the basic features of the aerosol layer fairly well if the oxidation rates of the gaseous sulfur constituent are sufficiently low. This result, obtained exclusively by meteorological considerations and observations, is compared with laboratory measurements of reaction rates. (Author abstract modified)

55214 **APTIC NO. 79061**

Junge, C. E.

IMPORTANT PROBLEMS OF GLOBAL POLLUTION. *International Union of Geodesy and Geophysics, Paris (France), International Assoc. of Meteorology and Atmospheric Physics, Ontario (Canada), Australian Academy of Sciences, and Dept. of Transportation, Washington, D. C., Int. Conf. Struct., Compos. Gen. Circ. Upper Lower Atmos. Possible Anthropogenic Perturbations, 1st, Melbourne, Australia, 1974, p. 1-16. 22 refs. (Jan. 14-25.)*

Problems related to pollution, to radiation, and to possible impact on climate are discussed for carbon dioxide, stratospheric aerosols, and ozone. Due to the slow exchange with the deep sea and the even slower chemical adjustment process of the ocean water any CO2 perturbation will take decades for reduction and even longer for elimination. It is not possible at present to make any reliable quantitative statements about possible climate effects of CO2. The origins and formation of aerosols are discussed. The chemical reactions involving ozone in the atmosphere are also discussed, including the problems caused by the lack of good data on a variety of important trace constituents involved.

55215 **APTIC NO. 79063**

Katen, Paul C.

INTERMEDIATE RANGE TRANSPORT OF LEAD FROM AUTOMOTIVE SOURCES. *National Science Foundation, Washington, D. C., Research Applied to National Needs, Trace Contam. Conf. Proc. 2nd Annu., Pacific Grove, Calif., 1974, p. 89-94. 7 refs. (Aug. 29-31.)*

NTIS: LBL-3217

An urban model describing the atmospheric dispersion and intermediate range transport of lead from automotive sources was developed. Only that portion of the emitted lead which remained airborne sufficiently long to reach air samplers at least 100 m from major roadways was considered. The Fort Collins, Colorado area was broken down into a series of 32 circular area sources, and the concentration within a particular circular area source was calculated with a uniformly mixed quasi-Lagrangian box model whose mixing height was parameterized so that surface concentrations were the same as if a series of infinite line sources were contributing to the receptor. The circular area sources were selected so that a smooth transition from the box to a Gaussian plume model was possible. Concentrations at the downwind edge of the source circle were matched to a continuous point Gaussian plume model which was subsequently used to predict downwind dispersion. The model calculations indicated that about 45% of the lead emitted by automobiles was still airbourne 10 km downwind of the urban area. (Author abstract modified)

55216 **APTIC NO. 79222**

Klein, F. and F. Teyssier

DISPERSION OF THE SULFUR DIOXIDE EMITTED BY A BATTERY OF SOAKING PITS. *(Etude theorique et experimentale de la dispersion de l anhydride sulfureux emis par une batterie de fours pits). Text in French. Cent. Doc. Siderurg. Circ. Inform. Tech., 31(5): 1249-1278, 1974. 14 refs.*

The dispersion of sulfur dioxide emitted by a battery of 24 soaking pits was studied in a numerical model and SO2 concentration measurements at ground-level around the battery by means of dry zinc acetate adsorbent layers. The soaking pits have individual stacks 37 m in height, arranged along a straight line. The temperature of the gas discharged is 650 C, and the SO2 concentration at the emission source is 5.31 g/sec. The calculations on the basis of Pasquill s model using Holland s formula showed good agreement with the SO2 concentration measurement data, and demonstrated that the contribution of the battery to the overall SO2 concentration at ground-level is both moderate and acceptable, even though the stack height is less than the 50 m presently required by environmental legislation. The findings indicate that the requirements concerning stack height in France are too strict.

55217 **APTIC NO. 79370**

Korzh, V. D.

SOME GENERAL LAWS GOVERNING THE TURNOVER OF SUBSTANCE WITHIN THE OCEAN-ATMOSPHERE-CONTINENT-OCEAN CYCLE. *J. Rech. Atmospheriques, 8(3-4):653-660, July-Dec. 1974. 38 refs. (Presented at the International Symposium on the Chemistry of Sea-air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

The fractionation of ions passing over from the ocean into the atmosphere depends mainly upon the correlation of ion concentrations in sea water. The ion concentration ratio in the sea s atmospheric moisture amounts to an average ratio of oceanic molar concentrations of two to three. The average ratios of calcium, potassium, and sulfate in rain water exceed the calculated values in some cases. The share of cyclic salts in the composition of river waters was estimated, based on the assumption that sea salts are carried over onto the continent at an average ratio similar to that of the sea atmosphere moisture. (Author abstract)

55218 **APTIC NO. 79100**

Lange, R. and J. B. Knox

ADAPTATION OF A THREE-DIMENSIONAL ATMOSPHERIC TRANSPORT- DIFFUSION MODEL TO RAINOUT ASSESSMENTS. *Preprint, California Univ., Livermore, Lawrence Livermore Lab., 21p., 1974. 4 refs. (Presented at the Precipitation Scavenging Symp., Champaign, Ill., 1974.)*

NTIS: UCRL-75731

A hybrid Lagrangian-Eulerian atmospheric transport-diffusion model for calculating the three-dimensional distribution of a nuclear aerosol after its down-range transport and diffusion to a site of precipitation scavenging is developed and validated. The numerical code for the model, known as Atmospheric Diffusion by Particle In-Cell (ADPIC), represents a convenient mathematical framework which includes the following effects on a regional basis: speed and directional wind shear, the occurrence of calms, space-variable surface roughness, wet and dry deposition, radioactive decay, gravitational settling, space- and time-dependent eddy diffusion parameters, and single or multiple sources of either continuous or instantaneous nature. ADPIC solves the three-dimensional advection diffusion equation in flux-conservative form using a pseudovelocity technique for a given regional mass-consistent advection field in three dimensions and in time. Validations against several existing closed form analytical solutions and with the aid of regional tracer releases of methyl iodine indicate that the ADPIC calculational method reproduces the standard deviation of the pollutant distribution to within 5%.

55219 **APTIC NO. 79123**

Lorenzen, Arndt

CLIMATE OF THE SACRAMENTO VALLEY AIR BASIN. *California Air Resources Board, Sacramento, Div. of Technical Services, 32p., Nov. 1974. 34 refs.*

The Sacramento Valley Air Basin in California is described in terms of three fundamental elements of air pollution climatology: topography, general weather types, and ventilation characteristics. The basin comprises the northern third of California s Central Valley as well as part of the surrounding mountain ranges. The highest frequency of air stagnation occurs in autumn during the period following the characteristic summer flow and before the season of winter storms. A broad, flat-gradient high pressure cell may lie over the basin for a prolonged period during the months of October and November in particular, and associated light winds or calm conditions intensify the air pollution potential of the valley. Reduced surface heating in the fall effectively shuts off the influx of marine air and inhibits vertical, convective air movement. Although summer inversions are strong and frequent in the valley, they are generally less troublesome than those in the fall because of accompanying brisk afternoon winds which provide good ventilation.

55220 **APTIC NO. 79140**

Lorenzen, Arndt

CLIMATE OF THE NORTH COAST AND LAKE COUNTY AIR BASINS. *California Air Resources Board, Sacramento Div. of Technical Services, 16p., Dec. 1974. 17 refs.*

The North Coast and Lake County Air Basins in California are described in terms of three fundamental elements of air pollution climatology; topography, general weather types, and ventilation characteristics. The basins are comprised of two major topographic units; the Klamath Mountains and the Coast Range provinces. The effective volume of air for dilution of pollutants in low lying coastal valleys in the basins is severely limited under conditions of low marine inversion. Relatively long dry periods from July to October coincide with the weakest air flow in general, and the greatest air pollution potential is expected in the late summer and autumn.

55221 **APTIC NO. 79152**

Low, Richard D. H.

MICROPHYSICAL EVOLUTION OF FOG. *Army Electronics Command, White Sands Missile Range, N. Mex., Atmospheric Sciences Lab., Army Task 1T161 102B53A-20, Rept. ECOM-5533, OSD-1366, 34p., March 1974. 15 refs.*

NTIS, DDC: AD 776334

Microphysical and meteorological data for five fogs of the warm radiation or radiation-advection type were collected during field experiments in order to delineate the formative, mature, and dissipative stages of fog evolution in terms of droplet and cloud nucleus concentrations, liquid water content, visibility, and supersaturation. It was difficult to determine when the formative stage began and the dissipative stage ended, though information was obtained on separating formation from maturity and maturity from dissipation. The beginning of maturity was usually marked by a maximum in droplet concentration, liquid water content, and supersaturation and by a minimum in visibility and nucleus concentration. The beginning of dissipation was accompanied by a decrease in the first three parameters and by an increase in the last two. The rates of such decreases and increases are also important in distinguishing maturity from dissipation. (Author abstract modified)

55222 **APTIC NO. 79507**

Ripperton, Lyman A.

EASTERN UNITED STATES HIGH OZONE CONCENTRATION: CHEMICAL ASPECTS. *Clean Air, 1974:79-82, Nov. 1974. 13 refs.*

The chemical aspects of high ozone concentrations measured in nonurban regions in the eastern United States are reviewed. Ozone measurements in nonurban areas that exceed the National Ambient Air Quality Standard of 0.08 ppm (oxidants) appear to be the result of ozone precursors transported from cities. The chemistry of the phenomenon involves the generation of ozone in a system of low nitrogen oxide concentration and ozone-unreactive organic compounds. One of the most important details of the chemistry that is yet to be worked out is the origin of a sufficient flux of hydroxyl radicals to drive the system.

55223 **APTIC NO. 79015**

Schulze, Rudolf

THE INCREASE OF BIOLOGICALLY EFFECTIVE ULTRAVIOLET SOLAR RADIATION DUE TO A DECREASE OF THE OZONE CONCENTRATION IN THE FREE ATMOSPHERE. *(Ueber die Zunahme der biologisch sirksamen ultravioletten Sonnenstrahlung bei Verminderung der Ozonkonzentration in der freien Erdatmosphaere). Text in German. Radiat. Environ. Biophys., vol. 11:21-30, March 1974. 12 refs.*

Carcinogenic ultraviolet radiation levels were computed for several geographical latitudes and different seasons. More than 70% of the ultraviolet radiation appears to be received by the equatorial zone from 30 deg north to 30 deg south. Decreases in atmosphere ozone from 3 mm to 2.5 mm as a result of stratospheric aircraft exhaust are accompanied by a 31% increase in ultraviolet radiation. Increases in spectral irradiation due to decreasing ozone concentrations are also computed.

55224 **APTIC NO. 79062**

Seiler, W. and U. Schmidt

NEW ASPECTS ON CO AND H2 CYCLES IN THE ATMOSPHERE. *International Union of Geodesy and Geophysics, Paris (France), International Assoc. of Meteorology and Atmospheric Physics, Ontario (Canada), Australian Academy of Sciences, and Dept. of Transportation, Washington, D. C., Int. Conf. Struct., Compos. Gen. Circ. Upper Lower Atmos. Possible Anthropogenic Perturbations, 1st, Melbourne, Australia, 1974, p. 192-222. 42 refs. (Jan. 14-25.)*

Carbon monoxide measurements in the upper and lower troposphere in both hemispheres as well as in the lower stratosphere of the northern hemisphere over the Atlantic are used for a detailed discussion of the latitudinal CO distribution in the troposphere and lower stratosphere. The mean latitudinal CO distribution shows a maximum in middle northern latitudes with a CO value of 0.18 ppm and a minimum at 50 degrees south with 0.05 ppm. The CO mixing ratio (0.05 ppm) in the lower stratosphere seems to be constant between the two hemispheres. The individual CO sources and sinks are discussed and the corresponding production and consumption rates are estimated. These data are used for the calculation of the stationary CO distribution as a function of latitude which is then compared with the measured latitudinal CO distribution. The hydrogen mixing is only slightly different between the two hemispheres with 0.558 ppm in the northern and 0.548 ppm in the southern hemisphere. Hydrogen measurements and model calculations indicate fairly well that H2 is also produced by anthropogenic processes. This source contributes about 60% of the total H2 production so that H2 has to be considered as a pollutant in the troposphere. (Author abstract)

55225 **APTIC NO. 79109**

Semonin, Richard G.

URBAN-INDUCED WEATHER MODIFICATION. *Earth Environ. Resour. Conf. Digest Tech. Papers, vol. 1974:40-41, Sept. 1974. 2 refs.*

Data from the Metropolitan Meteorological Experiment in the St. Louis area are presented as evidence of urban-induced weather modification. The average heat island effect due to urbanization in the St. Louis area is reflected by approximately a 1 C change in temperature at 1000 ft above ground. Upwind and downwind measurements of condensation nuclei reveal a threefold increase in concentrations downwind of the city. Surface temperature and moisture distribution appear to be directly related to the initial development of cumulus clouds. The urban effect on the area s weather is estimated to have resulted in a 20-30% increase in the combined 1971-1972 rainfall for the region extending from Edwardsville south toward Belleville, Illinois. The thunder-day frequency data show a city-related increase of 20%. Rain cells affected by the St. Louis area result in an average rainfall volume of 216% greater than that for a control cell.

55226 **APTIC NO. 79102**

Slinn, W. G. N.

ATMOSPHERIC AEROSOLS: SOURCES, CONCENTRATIONS AND BUDGETS. *Preprint, Atomic Energy Commission, Washington, D. C., 17p., 1974. (Presented at the Atmosphere-Surface Exchange of Particulate and Gaseous Pollutants Symposium Proceedings, Richland, Wash., Sept. 4-6, 1974.)*

NTIS: BNWL-SA-5061

Sources, concentrations, and budgets of atmospheric aerosols are discussed. Topics covered include: the characterization of size distributions and concentrations of aerosols released from different sources; the usefulness of plotting the aerosol log-area distributions rather than number, volume, or other distributions; the application of Eulerian-frame and Lagrangian-frame aerosol particle concentration gradients to studies of dry deposition and resuspension; the rate-limiting characteristic of dry deposition; diffusion above the boundary layer; the possible replacement of the theory of deposition to a smooth surface based on eddy diffusivity by the Joukowski caterpillar-tread model of turbulence; the usefulness of data on the wind erosion of soils in accounting for the variability of the particle resuspension factor; the relationship of the the particle size distribution of resuspended soil particles to the soil particle size distribution and probability distribution of the horizontal wind; and the possible use of Joukowski s caterpillar-tread model of turbulence for analyzing the vertical aerosol distribution as dictated by the probability distribution of the vertical wind component.

55227 **APTIC NO. 79402**

Stefani, Giovanni

THE BEHAVIOUR OF EXTREME AIR TEMPERATURES AT ROME DURING THE LAST HUNDRED YEARS AND A HYPOTHETICAL EXPLANATION BASED ON ATMOSPHERIC POLLUTION. *(L andamento delle temperature estreme a Roma negli ultimi cento anni e sua connessione con un ipotesi di inquinamento). Text in Italian. Riv. Meteorol. Aeronaut., 34(3):181-192, Sept. 1974. 10 refs.*

The time behavior of the average maximum and minimum temperatures is found for the following periods by the method of running means: last ten days of January, first ten days of February and last ten days of July, and first ten days of August. The data have been collected by the Collegio Romano Observatory from 1860 to 1970. The analysis of these data, carried out by considering thirty year means with a ten year phase shift, shows a behavior which is consistent with the hypothesis of an aerosol polluted atmospheric layer characterized by solar radiation absorbing and reflecting properties. (Author abstract)

55228 **APTIC NO. 79471**

Turekian, K. K., D. P. Kharkar, and J. Thomson

THE FATES OF PB210 AND PO210 IN THE OCEAN SURFACE. *J Rech. Atmospheriques, 8(3-4):639-646, July-Dec. 1974. 13 refs. (Presented at the International Symposium on the Chemistry of Sea-Air Particulate Exchange Processes, Nice France, Oct. 4-10, 1973.)*

The concentration of lead 210 and polonium 210 in surface sea water is related to the atmospheric supply rate of Pb210 and the decay of oceanic radium 226, and the relative removal fluxes of Pb210 and Po210 by particle transport to the deep water. The Po210 to Pb210 activity ratio in marine zooplankton reflects the ratio in sea water which in turn reflects productivity. The atmospheric flux of Pb210 at different oceanic sites is calculated from values of Pb210 and Po210 concentrations in sea water and the partition coefficient of the Po210 to Pb210 ratio between plankton and surface sea water. The mean residence times of Pb210 and Po210 in the mixed layer have also been calculated for these sites. A significant excess Po210 flux from the ocean surface to the atmosphere may exist. (Author abstract)

55229 **APTIC NO. 79316**

Turpin, P.-Y., G. Madelaine, and J. Bricard

PHOTOELECTRIC GRANULOMETRIC STUDY OF MARINE AEROSOLS IN THE SIZE RANGE OF 0.03-2 MICRON. *(Granulometrie photoelectrique des aerosols en provenance de la mer dans le domaine 0.03-2 micron). Text in French. J. Rech. Atmospheriques, 8(3-4):699-708, July-Dec. 1974. 9 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1975.)*

A photoelectric size analyzer was developed for the measurement of size distribution particles of radius r (0.03 micron less than r less than 0.2 micron) using a photonic detection technique. The technique is used to characterize the different atmospheric aerosols in the range 0.03 less than r less than 2 micron. Aerosols were measured directly on the sea side at the Centre of Nuclear Studies of La Hague, on the N. W. coast of France. Two other apparatus are used for comparison studies: one size analyzer which permits the detection of particles of radius over 0.2 micron and a condensation nuclei counter which makes it possible to count the whole population of particles from 10 A to 1 micron. Without any external source of pollution, the distribution of the aerosol from sea origin follows the pattern of Junge curves, with a mode near to 0.05 micron in radius. The influence of the salt nuclei on the slope of the size distribution is shown.

55230 **APTIC NO. 79124**

Unger, Charles D.

CLIMATE OF THE SAN JOAQUIN VALLEY AIR BASIN. *California Air Resources Board, Sacramento, Div. of Technical Services, 21p., Dec. 1974. 21 refs.*

The San Joaquin Valley Air Basin in California is discussed in terms of three fundamental elements of air pollution climatology: topography, general weather types, and ventilation characteristics. The air basin includes portions of two major topographic units: the Great Valley and the Sierra Nevada. The valley s climate is one of hot summers and cool, rainy winters. The most significant single control on the weather pattern is the semi-permanent subtropical high pressure belt, often referred to as the Pacific High. Wind speeds are generally highest during the spring months and lightest in the fall and winter. The winter season has the poorest conditions for vertical mixing of pollutants. Although morning mixing heights are about the same as for other seasons, the afternoon heights are considerably lower. This is largely due to the high incidence of fog and clouds which retard surface heating and resultant vertical air movement.

55231 **APTIC NO. 79149**

Werle, H.

INVESTIGATIONS CONCERNING THE MODELING OF COOLING TOWER PLUMES IN SMALL-SCALE EXPERIMENTS. *(Untersuchungen zur Nachbildung von Kuehlturmfahnen in Modellexperimenten). Text in German. Kernforschungszentrum Karlsruhe (Germany), Inst. fuer Neutronenphysik und Reaktortechnik, 75p., Aug. 1974. 10 refs.*

NTIS: KFK 1984

Theoretical and experimental studies of cooling tower plume behavior are reported. Modeling studies in low speed wind tunnels are used to determine the influence of condensation and evaporation on the temperature and velocity field, the exchange coefficients characteristic of self-turbulence of a plume, and data on fog plume length and asymptotic height. A theoretical model which uses the initial moisture of the cooling tower air, the atmospheric moisture and temperature distribution, and the wind velocity to determine the rise and diffusion of cooling tower plumes is also presented. The possibility of a second fog plume occurring as a result of adiabatic temperature decreases at certain heights is demonstrated.

1973

55232 **APTIC NO. 79375**

Higashidani, H. and S. Kubo

AIR POLLUTION AND WEATHER CONDITIONS AT IWAKI AREA. *(Iwaki chiku no taiki osen to kisho). Text in Japanese. In: Area Survey and Research Materials at Akita, Yamagata and Fukushima in 1973, 12p., 1973. 4 refs.*

Since the establishment of 16 pollution observatories in Onahama and Nakoso districts in 1972, air pollution control in the Iwaki area has been carried out. The correlation between the distribution of sulfur oxides and weather conditions, especially the direction and velocity of wind, has been studied. A main purpose of this study is to find a way to forecast the wind conditions in this area. As the industrial belt is located on the coast line, the distribution of pollutant correlated strongly with time dependent weather conditions. The direction and velocity of wind in Iwaki area might be forecasted from the data on wind direction in the Sendai area, and from the temperature difference between the maximum temperature in Fukushima City and water temperature at Onahama coast.

55233 **APTIC NO. 79016**

Lacaze, Jean and Alexandru Grigoriu

ACOUSTIC MEASUREMENT OF MEAN VALUES OF WIND AND AIR TEMPERATURE IN THE DIFFUSION LAYER OF AIR POLLUTION. *(la mesure acoustique des valeurs moyennes du vent et de la temperature de l air dans la couche de diffusion de la pollution atmospherique). Text in Romanian. Rev. Roum. Geol., Geophys. Geogr. Ser. Geol., 17(2):183-187, 1973.*

Equations are derived for obtaining mean values of wind speed and direction and atmospheric temperature for inversion layers of air pollution. The calculations are based on acoustical and optical measurements of signals produced by aircraft or balloon at a height comparable with that of the inversion layer. The return of the optical signal is considered to be instantaneous, while the acoustical signal is received after some time period that corresponds to the nature of the air layer.

55234 **APTIC NO. 77111**

Moroz, William J. and Ching-Ming Sheih

MODELING OF POLLUTANT CONCENTRATIONS. *Pennsylvania State Univ., University Park, Pa., Center for Air Environment Studies, Environmental Protection Agency Grant AP 01082, Publ. 298-73, p. 1-114, Feb. 1973.*

A computational stability analysis is performed for the difference equations of the lake breeze model. The results give the criteria for determining the spatial and temperal intervals in the numerical computations. The diurnal wind variations in the planetary boundary layer are studied in order to understand better the wind variations due to the Coriolis force for the interpretation of the lake breeze or wind variations in the atmospheric boundary layer in general. The lake breeze model is developed and applied to the region of Lake Ontario at Toronto. Because the available Gaussian diffusion models fail to take care of the situation with local wind circulations and the available grid diffusion models are incapable of giving the necessary spatial resolution for an urban modeling, a Lagrangian puff model is developed and presented. (Author abstract modified)

55235 **APTIC NO. 79028**

Zeipel, Evald von

A REVIEW OF THE LITERATURE ON METHODS OF DETERMINING THE EFFECT ON VISIBILITY OF ATMOSPHERIC PARTICLE CONCENTRATION, SIZE AND SIZE DISTRIBUTION. *(Litteraturstudie over metoder att bestamma atmosfarens siktpaverkande partiklars koncentration och storlekfordelning). Text in Swedish. Research Inst. of National Defense, Division 2, Stockholm, Sweden, Rept. FOA 2, 12p., March 1973. 24 refs.*

NTIS: N75-12471

Methods for the collection and recording of airborne particles which influence visibility are reviewed, and a new electrostatic particle separator is proposed. Particles usually reduce visibility considerably after water has condensed on them. Consequently, such particles are spherical, and are composed mainly of water. Such airborne particles are greater than 0.000005 cm, while smaller particles reduce visibility only slightly. Particles in stagnant air can be analyzed by means of sedimentation or diffusion chambers, and in condensation nuclei counters. For measurement under dynamic conditions, sampling on fiber filters, by means of impactors, or electrostatic precipitators is possible. An electrostatic particle separator, composed of an elongated cylindrical condenser, in which the conductive coat of the high-voltage cylinder is subdivided into isolated sections, is proposed. At a field force in the order of magnitude of 1000 volts/cm, the migration speed is 0.02-1 cm/sec. This particle separator must be combined with an impactor for particle sizes over 0.00001 cm.

1972

55236 **APTIC NO. 77113**

Trout, Dennis A.

EFFECTIVE POINT SOURCE MODELLING OF AN URBAN COMPLEX FOR MESO-SCALE ESTIMATES OF AIR POLLUTION. *Pennsylvania State Univ., University Park, Pa., Dept. of Meteorology, Environmental Protection Agency Grant APO1082-02, CAES Publ. 240-72, p. 1-38, 1972. 13 refs.*

A workable model for the prediction of air pollutant concentrations at meso-scale distances (up to 150 km) from large urban complexes using the theory of an effective point source for the entire city s emissions was investigated and constructed. The investigation consists of the collection of data and the analysis of sulfur dioxide concentrations from fixed sites, automobile, and aircraft for the city of St. Louis, Missouri during November 1970, January, and February 1971. Observed and predicted data were compared for specific dates in November 1971. Data collected in January and February 1971 are still being analyzed. Situations in which the trajectories of the wind were too irregular (wind direction deviations of more than 20 deg from the mean wind over a preceding 12 hour period) or when the wind speeds were too light (less than 4 knots for more than three hours in a proceeding 12 hour period) could not be modelled adequately. The concentrations of sulfur dioxide from the large urban complexes of St. Louis and Alton can be reasonably well approximated by effective point sources for the entire area source of emissions, by maintaining the same effective point source distances, and emissions source strengths, given the transport wind velocity, the mixing depth, and the Pasquill stability class, for conditions of persistent steady winds and a sustained elevated, low-level inversion.

1971

55237 **APTIC NO. 79070**

Ellis, Howard T. and Rudolf F. Pueschel

SOLAR RADIATION: ABSENCE OF AIR POLLUTION TRENDS AT MAUNA LOA. *Science, vol. 172:845-846, May 21, 1971. 8 refs.*

Measurements of solar radiation made at Mauna Loa, Hawaii over a 13-year period give no evidence that human activities affect atmospheric turbidity on a global scale. Short-term fluctuations in insolattion appear to be associated with naturally produced tropospheric aerosols. The intrusion of volcanic dust into the stratosphere appears to result in prolonged increases in atmospheric opacity due to the extended residence times of aerosols in the stratosphere. Data on temporal variations in the monthly means of transmission factors of solar radiation are graphically depicted for the period 1958-1970. (Author abstract modified)

BASIC SCIENCE AND TECHNOLOGY

1975

55238 **APTIC NO. 79512**

Baranowski, Jerzy and Lechoslaw Jarzebski

DETERMINATION OF THE BINDING CAPACITY OF DUST IN THE PRESENCE OF WATER. *(Metoda oznaczania zdolnosci pylu do wiazania w obecnosci wody). Text in Polish. Ochrona Powietrza (Warsaw), 47(3):65-68, 1975. 14 refs.*

The binding phenomenon of industrial dusts in the presence of water and the determination of the basic magnitudes in this process are discussed. The phenomenon is complex in nature and has the characteristics of surface kinetics; the fundamental factors involved are: mechanical, spontaneous dust sedimentation immediately after mixing with water; agglutination resulting in the formation of dust particle agglomerates; evaporation of water leading to contact drying of the dust layer thus formed; chemical reactions and dissolubility of salts contained in the dust during the binding process, dependent on the chemical composition of the dust. Gravitational and hydrostatic forces contribute to dust sedimentation and packing, particularly of the granular fraction of industrial dusts. Agglutination or size reduction of the solid phase as the result of dust particle contact with water particles leads to the deformation of the interface with the establishment of sphericality of water and dust particles. Because of the different chemical compositions of industrial dusts, hydration and hydrolysis progress in different ways for dusts originating in the binding-material- manufacturing industry, foundry, metallurgical and grinding guy dusts. The magnitudes characteristic of the binding phenomenon of industrial dusts when mixed with water, were determined by the Vicat apparatus. Chalk dust showed the highest water-binding capacity due to its physicochemical properties, foundry dust the lowest.

55239 **APTIC NO. 79455**

Bedair, S. M. and S. S. Aly

FOG DISSIPATION USING 10.6 MICRON RADIATION. *Infrared Phys., 15(3):233-237, Sept. 1975. 7 refs.*

Coupled nonlinear equations governing the transmission of laser radiation (10.6 micron wavelength) through fog are formulated and numerically solved to investigate the feasibility of using radiant energy to dissipate fog. The incident radiation is assumed to be of sufficient intensity to vaporize water particles in the path of the laser beam, thus allowing a greater percentage of the incident energy to be transmitted. Heat conduction losses from the droplets to the surroundings result in an increase in the time of initiation of evaporation fronts in the medium. Solutions are obtained for both uniform and Gaussian particle size distributions, with the latter showing better agreement with experimental results. (Author abstract modified)

55240 **APTIC NO. 75895**

Bentley, Michael

PHOTOCHEMICAL OXIDATION OF KRAFT AIR POLLUTANTS (FINAL REPORT). *Maine Univ., Orono, Environmental Protection Agency Grant 800209, Program Element 1A1008, ROAP 26AAD-14, Rept. EPA-650/3-75-005, 17p., May 1975. 20 refs.*

NTIS: PB 243599/AS

Gas chromatography-mass spectroscopy analyses of products resulting from the photolysis of compounds associated with kraft pulping emissions were performed. The photolysis of methyl mercaptan in air yielded dimethyl disulfide, methanesulfonic acid, ethyl mercaptan, methanol, formic acid, methane, sulfur trioxide, and sulfur dioxide in addition to other presently unidentified compounds. The photolytic products of dimethyl sulfide in air included methanesulfonic acid, methylmethanethiosulfonate, methanesulfinic acid, methyl formate, sulfur, sulfur dioxide, and sulfur trioxide in addition to other unidentified compounds. The photolysis of methylmethanethiosulfonate in tetrahydrofuran resulted in the formation of methane, methyl mercaptan, dimethyl sulfide, dimethyldisulfide, methanesulfinic acid, methanesulfonic acid, and sulfur dioxide. An unusual thermal elimination resulted in the conversion of N-isopropyl-S-benzylsulfenamide to N-isopropylbenzalimine. Lithium amides were found to form sulfenamides upon reaction with disulfide. (Author abstract modified)

55241 **APTIC NO. 79499**

Boushehri, A. and S. Afrashtehfar

DUFOUR EFFECT IN GASES. *Bull. Chem. Soc. Japan (Tokyo), 48(8):2372-2374, 1975. 15 refs.*

The diffusion thermoeffect (Dufour effect) was investigated for five different gas mixtures: hydrogen-nitrogen, hydrogen-oxygen, hydrogen-nitrous oxide, helium-nitrous oxide, and helium-oxygen. The diffusion thermoeffect involves the measurement of the transient temperature gradient which results from an initial concentration gradient as interdiffusion occurs and is closely related to the inverse phenomenon of thermal diffusion. Measurements taken at 25 C and 700 torr pressure showed maximum temperature changes of 0.17, 0.14, 0.25, 0.19, and 0.11 C for the above gas mixtures, respectively. Values of the thermal diffusion factor were calculated for the above mixtures from the experimental data on the basis of the thermodynamics of irreversible processes.

55242 **APTIC NO. 79525**

Bulygin, B. M.

THERMAL DECOMPOSITION OF NITROGEN-CONTAINING POLYMERS. *(Termicheskoe razlozhenie azotsoderzhashchikh polimerov). Text in Russian. Plast. Massy, no. 5:24-27, 1975. 4 refs.*

The composition of gases generated during the pyrolysis of polyurethane, polytriisocyanurate and polycarbodiimide foams, as well as of aromatic polyamides, polyacrylonitrile, and natural protein polymers at 500 and 800 C was studied. Hydrogen cyanide, carbon monoxide, and carbon dioxide were identified as the major components of the pyrolytic gases at both temperature levels. A linear relationship was established between the logarithm of the HCN concentration in the gases and the oxygen-nitrogen ratio in the polymer, which indicates the destruction of HCN by the oxygen present in the plastic material. Air added into the pyrolytic chamber had no influence on the HCN concentration. The amount of the HCN generated was smallest in the case of polyurethanes, and highest in the case of natural protein polymers and polyacrylonitrile. Polyamides generated considerable amounts of HCN and CO first at 800 C. The quantity of the smoke generated was between 9 and 11% for all polyurethanes, and it was considerably higher in the case of polyamides and natural polymers. The quantity of the smoke generated by polyacrylonitrile and urea formaldehyde was negligible. Most of the HCN generated during the pyrolysis was found adsorbed on the solid particles of the smoke.

55243 **APTIC NO. 77206**

Chang, S. G. and T. Novakov

FORMATION OF POLLUTION PARTICULATE NITROGEN COMPOUNDS BY NO-SOOT AND NH3-SOOT GAS-PARTICLE SURFACE REACTIONS. *Atmos. Environ., 9(5):495-504, May 1975. 24 refs.*

X-ray photoelectron spectroscopy was used to study the formation of reduced nitrogen compounds resulting from the surface interaction of ammonia or nitric oxide with soot particles. Nitrogen species of the ammonium, amine and/or amide, and the nitrile type which are associated with particulate air pollution were synthesized. Volatile hydroxyl and carbonyl ammonium salts (and/or physically adsorbed ammonia species) were produced in soot-NO and soot-NH3 reactions at ambient temperatures; while amines, amides, and nitriles were produced at higher temperatures. A proposed mechanism was in qualitative agreement with field observations. (Author abstract modified)

55244 **APTIC NO. 77212**

Chung, Kuenja, Jack G. Calvert, and Jan W. Bottenheim

THE PHOTOCHEMISTRY OF SULFUR DIOXIDE EXCITED WITHIN ITS FIRST ALLOWED BAND (3130 A) AND THE FORBIDDEN BAND (3700-4000 A). *Intern. J. Chem. Kinet., 7(2):161-182, March 1975. 41 refs.*

Quantum yields of sulfur trioxide formation were determined in pure sulfur dioxide and in SO2 mixtures with nitric oxide, carbon dioxide, and oxygen using both flow and static systems. The excitation of SO2 was affected within the forbidden band (3700-4000 A) and within the first allowed singlet band (3130 A) in separate series of experiments. The results were rationalized quantitatively in terms of the reaction of sulfur monoxide with SO3 and the reaction of 2 moles of SO to generate SO2 and sulfur. Rate constants were also estimated for significant reactions. Quantum yields from triplet excitation experiments at high flow rates of NO-SO2 and CO2-SO2 mixtures showed that the sole reactant with SO2 leading to SO3 formation in the system was the forbidden species of SO2. Both singlet and triplet excited states played a role in SO3 formation when SO2 was excited at 3130 A. The inhibition of SO2 formation by NO suggested that the SO3-forming triplet state generated in this singlet excited SO2 systems possessed a relative reactivity toward SO2 and NO which was equal to that observed for the forbidden SO2 species. Either forbidden SO2 molecules were created with an unexpectedly high efficiency in 3130 A excited SO2 quenching collisions or another reactive triplet of almost identical reactivity to the forbidden species was important. (Author abstract modified)

55245 **APTIC NO. 76944**

Dabora, E. K.

EFFECT OF NO2 ON THE IGNITION DELAY OF CH4-AIR MIXTURES. *Combustion Flame, 24(2):181-184, April 1975. 13 refs.*

The anomalous behavior in the induction period of methane-air mixtures when nitric oxide or nitrogen dioxide is added was investigated. The ignition delays were measured in a shock tube with helium as the driver gas. Reflected shock wave experiments indicate that a reduction of 1/2 - 1/3 in ignition delay can be realized when 1-2% NO2 is added to stoichiometric mixtures at a temperature range of 13800-1800 K and pressures around 14 atms. The addition of .12% NO2 had little effect on the ignition delay became measurable. A least square fit for the pure methane data and the .12% NO data resulted in an activation energy of 41.9 kcal/mole, whereas for the 1-2% NO data, the activation energy was 25.27 kcal/mole, compared with the 30.8 kcal/mole for 0% and the .12% NO2 mixtures, and 22.8 kcal/mole for 1-2% NO2 mixtures. The apparent wide differences in activation energy must at present be considered real. A correction for heat release from the overall chemical reaction does not account for the discrepancy. It must be concluded that the effect is chemical rather than thermal.

55246 **APTIC NO. 77004**

Dorko, Ernest A., Davy M. Bass, Robert W. Crossley, and Karl Scheller

SHOCK TUBE INVESTIGATION OF IGNITION IN METHANE-OXYGEN-NITROGEN DIOXIDE-ARGON MIXTURES. *Combustion Flame, 24(2):173-180, April 1975. 15 refs.*

The ignition of methane-oxygen-nitrogen dioxide mixtures highly diluted with argon was examined in the region behind a reflected shock wave in a single pulse shock-tube. The measurements covered temperatures of 1200 to 1800 K, pressures of 3 to 20 atm, total gas concentrations of 3.3-4.5 times 10 to the -5 power mol/cc and fuel-oxidizer mixture equivalence ratios of 0.38-1.60. The induction times ranged from 13 to 580 microsec for a maximum dwell time of about 700 microsec. When this system was compared to a CH4-O2-Ar system, it was found that NO2 addition shortens the induction time. The ignition temperature was also lowered by about 200 C by the addition of NO2. An equation correlating the dependence of induction time on concentration for an oxidizer ratio range of 25-75% NO2 is given. A product analysis showed that during preignition methane decreases substantially when NO2 is present and much larger quantities of carbon monoxide are formed than when no NO2 is involved. A mixture of CH4-NO2-Ar produced pressure and temperature oscillations. It is suggested that an important step when NO2 is present is its decomposition to produce nitric oxide and O. The reaction between CH4 and O becomes an important contributor to chain branching. Other aspects of the mechanism are discussed qualitatively. (Author abstract modified)

55247 **APTIC NO. 77178**

Durbin, Paul and Thomas A. Hecht

THE PHOTOCHEMISTRY OF SMOG FORMATION. *Clean Air, 9(1):8-11, 16, Feb. 1975. 7 refs.*

A model of the photochemical reactions involved in smog formation is presented. The principle reactants in the scheme include various hydrocarbons, aldehydes, nitric oxide, nitrogen dioxide, and air. When a mixture of these species is irradiated with either natural or artificial sunlight, the organic compounds are oxidized, forming free radical intermediates that react with NO. The disappearance of hydrocarbons and NO is accompanied by the accumulation of NO2, aldehydes, organic and inorganic nitrates, peroxides, and ozone, products collectively shown as smog. The various reaction schemes involved are schematically illustrated.

55248 **APTIC NO. 79500**

Eiden, Reiner

FOURIER REPRESENTATION OF THE ENERGY DISTRIBUTION OF AN ELECTROMAGNETIC FIELD SCATTERED BY SPHERICAL PARTICLES. *Appl. Opt., 14(10):2486-2491, Oct. 1975. 8 refs.*

A solution to the scattering problem for spherical particles is presented in terms of a Fourier series expansion for the electromagnetic field as well as for the corresponding energy distribution. The basic assumptions used are the same as for the Mie solution. The Fourier coefficients of the energy distribution show a systematic behavior as functions of the size parameter alpha which is equal to the quantity two times pi times the particle radius divided by the wavelength of the scattered light. The Fourier coefficients also depend significantly on the complex index of refraction. The coefficients are approximately proportional to the volume of the sphere superimposed with an oscillation of the Bessel function type and can be measured directly without any intricate Fourier analysis. The Fourier coefficients also can be used to determine the optical properties of particles of an unknown material. The scattering influence of a gaseous carrier medium can be eliminated by using an appropriate Fourier coefficient of the scattered energy distribution. (Author abstract modified)

55249 **APTIC NO. 77104**

Fisher, George E.

CHANGES IN LEVELS OF ATMOSPHERIC OXYGEN AND CARBON DIOXIDE PRODUCED BY BURNING OF FOSSIL FUELS AND BY CHANGES IN LAND USAGE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1975. 20 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-46.5.)*

A balanced geochemical model of the oxygen, carbon dioxide, and carbon cycles on land and in the ocean is used to investigate changes in atmospheric levels of CO2 and O2 resulting from the burning of fossil fuels and from alterations in the amount of land vegetation. The burning of fossil fuels is predicted to exert only transitory effects over time periods of thousands of years. Initially large amounts of CO2 added to the atmosphere are eventually absorbed by the oceans. Initial changes in the amount of land-based vegetation (photosynthesis) produce rapid (100 yr) changes in the atmospheric levels of CO2 and O2. The short-period excesses of deficits of CO2 are gradually reduced by the exchanges with the large oceanic reservoirs of CO2 and carbonates. Changes in atmospheric O2 are found to be less than 1% for all but the most extreme initial changes in the model. (Author abstract modified)

55250 **APTIC NO. 79314**

Fouad, M. Nabeil and M. Nader

THE DETERMINATION OF LEAD IN PETROLEUM PRODUCTS: A NEW TENTATIVE METHOD. *Inst. of Petroleum, London (England), Rept. IP 75-002, 19p., 1975. 7 refs.*

A tentative method for the determination of lead in petroleum products was developed. It is based on the extraction of Pb compounds from fuels either by an extraction mixture consisting of nitric oxide and potassium chlorate or by concentrated hydrochloric acid. The Pb in the extract is measured by titration with ethylene diamine tetraacetic acid (EDTA) solution using xylenol orange as indicator. The Pb compounds in lubricating oils are extracted with a mixture of hexane, ethanol, and acetone and the Pb determined in the extract by the EDTA titration procedure. The results are in good agreement with the results obtained by standard methods IP 116 and ASTM D 2547 and by atomic absorption spectrometry. (Author abstract modified)

55251 **APTIC NO. 79448**

Fruehwirth, Jaromir

THE LIBERATION OF ELECTRIC CHARGES FROM EVAPORATING CONDUCTING AEROSOL DROPS. *(Die Abgabe von elektrischer Ladung aus verdunstenden leitfaehigen Aerosoltropfen). Text in German. Arch. Meteorol. Geophys. Bioklimatol., Ser. A. (Vienna), 24(2):179-188, 1975. 9 refs.*

The loss of electric charges in evaporating, electrically conductive aerosol droplets was studied by a combined ultramicroscopic-photographic method in a microcuvette with homogeneous electrostatic deflecting field, using ethyl alcohol particles in a size range of 0.001-0.01 mm. The decrease of the electric charge of the evaporating aerosol droplets was a linear function of the droplet radius. Increase in the electrical charge density in the course of the evaporation process was observed.

55252 **APTIC NO. 79317**

Hillier, I. H. and J. Kendrick

MULTIPLET SPLITTING AND INTENSITY RATIO IN THE N(1S) PHOTOEMISSION SPECTRUM OF NO. *J. Chem. Soc. Faraday Trans. II, 71(9):1654-1656, 1975. 12 refs.*

Configuration interaction calculations of the 3II and 1 II states arising from N(1s) ionization of nitric oxide are described. The inclusion of orbital relaxation effects leads to improved agreement with the experimental multiplet splitting and intensity ratio compared to the frozen orbital approximation. Calculated correlation effects lead to an increased multiplet splitting and to poorer agreement with the experimental intensity ratio. Predictions are made concerning the shake up peaks which should be observed associated with N(1s) ionization. (Author abstract modified)

55253 **APTIC NO. 77191**

Kasaoka, Sigeaki, Haruo Kobayashi, Hisashi Nagi, Setsuo Inoue, Hisatake Tsumaki, and Tsunenori Kitamura

CATALYTIC REDUCTION OF NITRIC OXIDE WITH CARBON MONOXIDE. *(Issanka tanso ni yoru sanka chisso no sesshoku kangen sokudo). Text in Japanese. Nippon Kagaku Kaish. (J. chem. Japan), no. 8:1410, 1975.*

The catalytic reduction of nitric oxide with carbon monoxide under the presence of water and oxygen is investigated to find a suitable catalyst and the optimum reaction conditions. Various coprecipitated metal oxides were used as the catalysts and they were pretreated under hydrogen gas for 1 hr at 550 C. These catalysts were tested by a flow reactor under atmospheric pressure at 120 to 550 C and the reaction rate of the NO reduction reaction by CO in each catalytic system was determined. Under the presence of oxygen and water in the sample gas, ammonia was produced by the most of the catalysts tested and the reaction rate for the oxidation of carbon monoxide to carbon dioxide was faster than that for the reaction between NO and CO. The catalytic systems in 5 mol% cupric oxide-5 mol% tricobalt tetraoxide-90 mol% magnesium oxide, 25 mol% CuO-25 mol% Co304-50 mol% MgO, and 25 mol% CuO-25 mol% Co304-50 mol% aluminum oxide were the best. The use of a few % greater CO concentration than the stoichiometrically required concentration fo the CO oxidation to CO2 was necessary to obtain nearly 100% NO removal when the initial NO concentration was several hundred ppm. The optimum space velocity was below 40,000/hr and the formation of ammonia was negligible at thest space velocities. The reaction temperature required was 550 C.

55254 **APTIC NO. 77053**

Kitada, Toshihiro and Masakatsu Hiraoka

ONE ATTEMPT AT PHOTOCHEMICAL REACTION MODEL FORMATION. *(Kokagaku hanno moderu kosei no hitotsuno kokoromi). Text in Japanese. Preprint, The Society of Chemical Engineers Japan Tokyo (Japan), p. 68-69, 1975. (Presented at the Society of Chemical Engineers Japan, Lecture Meeting, 40th, Nagoya, Japan, April 2-4, 1975.)*

Photochemical reactions, which generate oxidant, are based on a nitrogen oxide-hydrogen-air mixture. An attempt was made to make models of these reactions. The reaction may be considered in terms of tens of order. The relationship between all the reactions has not yet been clarified. Reaction models that have been proposed so far were examined representing reactions in block diagrams. In photochemical reaction models, the main purpose is to incorporate the positive loop, which passes through nitrogen dioxide. By adopting models proposed so far, such as those of Hect, Eschenroeder, Akimoto and Kitada, they can be consolidated. If a positive loop is considered as it has been in the past, the model does not respond to the change of (HC)i.

55255 **APTIC NO. 77054**

Kitada, Toshihiro, Nobuo Aoki, and Masakatsu Hiraoka

A SMOG CHAMBER EXPERIMENT OF AIR POLLUTION PHOTOCHEMICAL REACTiONS. REPORT 2. *(Taiki osen kokagaku hanno no sumoggu chenba jikken). (Report 2). Text in Japanese. Preprint, The Society of Chemical Engineers, Japan, Tokyo, p. 70-71, 1975. (Presented at the Society of Chemical Engineers Japan, Lecture Meeting, 40th, Nagoya, Japan, April 2-4, 1975.)*

In order to make models of photochemical reactions occurring in the atmosphere, chamber experiments were conducted. Some results were obtained after conducting an irradiation test, using trans-2-butene and 1-butene-nitrogen oxide-air. For analysis of ozone, a chemiluminescence apparatus was used. Using the (hydrocarbon)i/(nitric oxide)i concentration as a parameter and 1-butene as the hydrocarbon, it was found that the greater the concentration ratio, the faster the (O3) maximum was reached. The (O3) maximum was achieved at a concentration ratio of (5-6). The time required to reach the (O3) maximum depended solely upon (HC)i/(NO)i, and not on the scope of (NO)i or (HC)i, other conditions, such as temperature, light volume, and kinds of hydrocarbon, being equal. The larger the (NO)i, the larger the (O3) maximum, if (HC)i/(NO)i was equal. The change of aldehyde emitted, in the case of trans-2-butene, 1-butene, was tested. In the case of trans-2-butene, the major product was acetaldehyde and in the case of 1-butene, it was propionaldehyde. Acetaldehyde functioned the same way as did hydrocarbon. When trans-2-butene is present, by its decomposition, the supply speed of aldehyde exceeds the speed of aldehyde decomposition, so that aldehyde continues to increase. The larger (HC)i/(NO)i was, the more quickly (O3) maximum was reached. Aldehydes such as acetaldehyde and propionaldehyde were intermediate products of NOx-hydrocarbon- air. Aldehyde continued to increase while olefins exist. After They have been consumed, it decreases, due to the photoreaction of NOx-aldehyde-air.

55256 **APTIC NO. 77154**

Lalo, C. and C. Vermeil

PHOTOCHEMISTRY OF SO2 IN THE VACUUM-U.V. II. LUMINESCENCE STUDIES. *J. Photochem., 3(6):441-454, March 1975. 32 refs.*

The photolysis of sulfur dioxide in hydrogen was studied at 147 nm (xenon line) and at 116.5-123.6 nm (kyrpton lines). Chemiluminescent reactions of photofragments resulted in the observation of SO2 fluorescence (xenon lamp), hydroxyl radical emission (xenon and krypton lamps), and sulfur and sulfur monoxide radical radiative transitions (krypton lamp). The SO radical emission observed with the krypton lamp was attributed to the photodissociation of SO2 at 116.5 nm (second krypton line). The phosphorescence of SO2, and not its fluorescence, was obtained only on irradiation with the krypton lamp and was interpreted as being the result of internal conversion from the excited state (singlet or more probably triplet) to the emitting first triplet state. The quantum yield for sulfur trioxide formation was less than or equal to 0.4 at 123.6 nm. The primary photodissociation processes giving sulfur and oxygen were more important with krypton lines than with the xenon line. (Author abstract modified)

55257 **APTIC NO. 77156**

Meagher, James F. and Julian Heicklen

THE PHOTOLYSIS OF HYDROGEN PEROXIDE IN THE PRESENCE OF CARBON MONOXIDE. *J. Photochem., 3(6):455-466, March 1975. 21 refs.*

The photolysis of hydrogen peroxide at 2537 A and 298 K in the presence of carbon monoxide was studied to obtain mechanistic information and rate data for reactions involving hydroxyl radicals which play an integral role in chemical reactions of the upper atmosphere and in photochemical smog production. The photodecomposition of H2O2 led to a chain reaction which was initiated by the reaction of OH radical with CO to give carbon dioxide and a hydrogen radical. The propagation of the chain reaction proceeded by the reaction of H radical with H2O2 to give OH radical and water. The chain was terminated by the reaction of H radical with H2O2 to give molecular hydrogen and the hydroperoxyl radical. The chain reaction was inhibited by the addition of oxygen which scavenged the H atoms. Rate constants for the reactions were also estimated. (Author summary modified)

55258 **APTIC NO. 79457**

Moortgat, G. K. and P. Warneck

RELATIVE O(1D) QUANTUM YIELDS IN THE NEAR UV PHOTOLYSIS OF OZONE AT 298 K. *Z. Naturforsch., 30a(6 and 7):835-844, June-July 1975. 26 refs.*

The photolysis of mixtures of ozone and excess nitrous oxide at wavelengths of 290-335 nm using monochromatic light with a band width of 4 nm was studied. The atomic singlet oxygen which was generated as the primary product reacted with N2O to produce nitric oxide which subsequently reacted with O3 giving rise to a weak infrared chemiluminescence. The emission intensity was directly proportional to the rate of atomic singlet oxygen production and was used to derive the relative singlet oxygen quantum yield as a function of wavelength between 295 and 320 nm. The data were normalized to a quantum yield of unity at 300 nm. The singlet oxygen quantum yield showed a temperature dependence, with the value being zero at 298 K up to 305 nm and declining to zero at 319 nm. The quantum yield was 0.57 at the dissociation limit which was taken to occur at 310.3 nm. (Author abstract modified)

55259 **APTIC NO. 79552**

Moroishi, Taishi, Atsuyoshi Shibuya, and Hirofumi Makiura

OXIDATION RESISTANCE OF MATERIALS FOR AUTOMOBILE EMISSION CONTROL SYSTEM. *(Taisanka-sei yori mita jidosha haigasu joka sochi yo zairyo ni tsuite). Text in Japanese. Sumitomo Kinzoku (Sumitomo Metals), 26(3):73-80, July 1975.*

Various emission control techniques have been developed to meet the 1975 and 1976 Japanese Automotive Exhaust Emission Standards. Materials used for the exhaust system with thermal reactors or catalytic converters are exposed to higher temperature than materials used in the present exhaust systems. The oxidation resistance of standardized commercial heat resistant steels (11 chromium-0.5 titanium, 12Cr, 18Cr, LC-18Cr-3 aluminum-Ti, 18Cr-8 nickel, 25Cr-20Ni, 22Cr-32Ni, 23Cr-30Ni-Al) and several new alloys (LC-18C-2Al-Ti, MC-18Cr-3Al-Ti, LC-18Cr-3Al-Ti) were tested. The increase in the amount oxidized with time or temperature, tensile strength and elongation at high temperature, and effect of alloy component on oxidation resistance, impact strength, and tensile properties were investigated. The fabricability of materials by press molding was also evaluated.

55260 **APTIC NO. 79391**

Osumi, M. and T. Kunitomo

CALCULATION OF ABSORPTION COEFFICIENT FOR THE V1 BAND OF SULFUR DIOXIDE. *J. Quant. Spectro. Radiative Transfer, 15(11):1055-1065, Nov. 1975. 10 refs.*

The absorption coefficients S/d of sulfur dioxide were calculated for the v1 band for temperatures from 300-1500 K, taking the major isotopic species 34-SO2 into consideration. The total number of the vibrational transitions considered were 4, 10, 23, 41, and 70 for temperatures of 300, 600, 900, 1200, and 1500 K respectively. The vibrational energy was calculated to the second order, and the rotational energy and maxtrix element were calculated exactly with consideration for the asymmetry of the SO2 molecule. The line intensities greater than 1.0 times 10 to the -8th/sq cm atm at standard temperature and pressure were included in the calculations. The wavenumber regions of 1000-1300/cm were divided into small intervals of delta omega equals 10/cm and the S/d averages over the delta omega were obtained. The S/d and some of the line intensities and positions at 300 K are in good agreement with other experimental work. (Author abstract modified)

55261 **APTIC NO. 77278**

Parker, Lee W.

FIELD CHARGING THEORY FOR ELECTROSTATIC PRECIPITATION OF ULTRAFINE PARTICLES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. 13 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-02.2.)*

A field charging theory for the electrostatic precipitation of ultrafine particles is proposed. The theory is concerned with particles of a radius smaller than the ion mean free path and considers the charging of heavy unipolar ions in an applied electric field according to a kinetics formulation. Ion trajectories are analyzed; and account is taken of the effects of the ion image force, particle charge, and particle polarization. Numerical solutions are obtained neglecting the image force, and comparisons are made with earlier theories and experimental data. The theory given charge values well below the experimental values of Hewitt for particles 0.09 micron in radius. The discrepancy may be due to the inappropriateness of a collisionless theory for this particle size and also in part to the neglect of the image force. (Author abstract modified)

55262 **APTIC NO. 79360**

Perrizo, Jerry, Larry A. Pugh, and K. Narahari Rao

BANDS OF NITROUS OXIDE AT 5.3 MICRON. *J. Mol. Spectr., 57(3):397-401, Sept. 1975. 10 refs.*

Several bands of nitrous oxide occurring in the region of 5.3 micron were measured by using a high resolution vacuum infrared spectrograph. The entire spectrum was recorded at three different gas pressures, 2, 12, and 45 mg mercury using an absorption path of 24 m. Wavenumber calibration is accomplished using the method of overlapping orders. The main features observed in the N2O spectrum are the 11(1)0-00(0)0 band and the associated hot bands, 12(2)0-01(1)0 and 12(0)0-01(1)0 of the N(14)2 O(16) isotopic species. Fragmentary structure of the 13(1)0-02(0)0 and 21(1)0-10(0)0 bands of N(14)2 O(16) in addition to the Q branches of the 11(1)0-00(0)0 bands of N(14)N(15)O(16), N(15)N(14)O(16), and N(14)2O(18) were also observed. The molecular constants derived from the data are tabulated. Some q-values were also obtained for the different isotopic varieties of N2O.

55263 **APTIC NO. 79362**

Polach, Wilhelm

INVESTIGATION ON THE INFLUENCE OF THE DIFFERENT CHEMICAL STRUCTURE OF FUELS ON THE EXHAUST EMISSIONS USING AN ENGINE WORKING ON DIFFERENT COMBUSTION PRINCIPLES. *(Der Kraftstoffeinfluss auf die Schadstoffemission von Motoren mit unterschiedlichen Verbrennungsverfahren). Text in German. Motortech. Z. (Stuttgart), 36(10):274-279, Oct. 1975. 8 refs.*

The effect of the chemical structure of fuels on exhaust emissions was investigated in diesel and Otto cycle engines. The chemical structure of fuels particularly influences nitric oxides emissions and soot formation. Alcohols and alcohol water blends reduce these exhaust components. Hydrocarbon emissions are influenced primarily by the vaporization mechanism during the formation of the inhomogeneous air fuel mixture. Carbon monoxide is not influenced. The most effective fuels are benzene, straight run gasoline, and alcohols. The fuel influence on exhaust emissions using diesel and Otto cycles is smaller than when using two-stage combustion with stratified charge in the swirlchamber.

55264 **APTIC NO. 79456**

Rabache, P. and B. Rebours

SPECTRAL ANALYSIS OF ABSORPTION COEFFICIENTS OF H2O, O3 AND O2 IN THE FAR INFRARED IN THE STRATOSPHERE. *Infrared Phys., 15(3):179-188, Sept. 1975. 21 refs.*

Absorption coefficient calculations for the synthetic emission spectra of water, ozone, and oxygen in the far infrared are presented for the lower stratosphere. Ozone appears to absorb a significant part of the radiation for altitudes above 16 km. The spectral lines due to oxygen appear in the measured spectra due to the fact that this constituent has a concentration 1000 times that of water and ozone at the altitudes considered. The calculations demonstrate that for suitable spectral regions and well defined measurement conditions the above stratospheric constituents can be isolated by their measured spectra. (Author abstract modified)

55265 **APTIC NO. 79075**

Rebbert, Richard E. and Pierre J. Ausloos

PHOTODECOMPOSITION OF CFCL3 AND CF2CL2. *J. Photochem., p. 1-16, 1975. 26 refs.*

The photochemical decomposition of the halocarbons CFCl3 (trichlorofluoromethane) and CF2Cl2 (dichlorofluoromethane) was investigated, using added methane and C2H6 (ethane) as chlorine atom interceptors. From the quantum yields of the stable products formed at 213.9, 184.9, 163.3, and 147 nm, quantum yields of the primary photofragments CFCl2, CF2Cl, CFCl, CF2, CF, and chlorine were derived. At wavelengths close to the absorption threshold, detachment of one chlorine from CFCl3 and CF2Cl2 occurs with a quantum yield of 0.95 + or - 0.05. As the photon energy is increased, there is a rapidly increasing probability that absorption of a photon leads to the release of two chlorine atoms. The CFCl or CF2 formed in these processes are unreactive towards the parent halocarbons, or alkanes. They combine with other free radicals to form stable products. No evidence is found for the cleavage of C-F bonds, or the elimination of stable chlorine molecules. In the vicinity of the absorption threshold, the absorption cross-sections of CF2 and CFCl3 diminish sharply with a decrease in temperature. (Author abstract modified)

55266 **APTIC NO. 79458**

Reed, L. D. and F. A. Morrison, Jr.

PARTICLE INTERACTIONS IN LOW KNUDSEN NUMBER THERMOPHORESIS. *J. Aerosol Sci., 6(5):349-365, 1975. 16 refs.*

A continuum-slip analysis of particle interactions in thermophoretic flows is presented, with particular emphasis on the hydrodynamic behavior of an aerosol particle undergoing thermal deposition. Exact analytical solutions are presented for the thermophoresis of two spheres along their line of centers as well as for the case of a sphere in motion normal to a flat surface. An approximation solution for the two spheres case which is valid for large separations is also given. The aerosol velocity decreases up to 10-15% by the time the particles are 1.5 radii away from the wall for the case of thermal deposition. Particle interactions in thermophoretic flows are considerably smaller than those calculated for corresponding Stokes motions. (Author conclusions modified)

55267 **APTIC NO. 77018**

Splettstoesser, W.

INVESTIGATION ON THE BINARY LAMINAR BOUNDARY-LAYER FLOW ALONG A VAPORIZING LIQUID LAYER. *(Untersuchung der laminaren Zweistoffgrenzschichtstroemung laengs eines verdunstenden Fluessigkeitsfilms). Text in German. Waerme Stoffuebertragung, 8(2):71-86, 1975. 40 refs.*

The clarification of the evaporating process in a film- evaporation combustion chamber is presented. Experimental and theoretical investigations were carried out for a flat vaporizing liquid film. The binary laminar boundary layer flow including heat and mass transfer was calculated, taking into account variable fluid properties. It was shown analytically and numerically, and confirmed experimentally that the equations for momentum, energy, and mass concentration yield similar solutions. The boundary-layer parameters and the influence of evaporation mass-flow are computed. Experimental results are in good agreement with theoretical calculations.

55268 **APTIC NO. 79468**

Sugi, Yoshihiro, Naoyuki Todo, and Toshio Sato

THE CATALYTIC REDUCTION OF NITRIC OXIDE BY CARBON MONOXIDE OVER A FE2O3 CATALYST. *Bull. Chem. Soc. Japan (Tokyo), 48(1):337-338, Jan. 1975. 5 refs.*

The mechanism of the catalytic reduction of nitric oxide by carbon monoxide over an iron oxide catalyst is described. The selective formation of nitrous oxide is observed at an early stage of the reduction and reflects the difference in adsorptivity between NO and N2O. The adsorption of NO is stronger than that of N2O. The NO and N2O formed on the catalyst establish an adsorption equilibrium, with the N2O being displaced by NO before it is converted to nitrogen. As the temperature is raised from 200 C to 300 C, a portion of the N2O formed on the catalyst is reduced to N2 before the displacement by NO.

55269 **APTIC NO. 79403**

Suzuki, Tadao, Toru Imai, Yasuo Sueyoshi, and Masanori Matsuno

STUDIES ON THE PHOTOCHEMICAL REACTION BY MOBILE SMOG CHAMBER. *(Idou sumogu chanba ni yoru kokagakuhanno ni kansuru kenkyu). Text in Japanese. Preprint, Society of Automotive Engineers of Japan, Tokyo, p. 597-600, 1975. (Presented at the Society of Automotive Engineers of Japan, Inc., Lecture Meeting, Kyoto, Oct. 29-30, 1975.)*

A mobile smoke chamber was used to study the photochemical reactions of the air of Kawasaki city, Suginami-ward of Tokyo, and Matsudo city. Air was sampled at 2 cu m/min through an inlet tube which was mounted on top of a smog chamber wagon. After the initial concentration of each pollutant was analyzed, the gas was irradiated with 144 ultraviolet lamps at an intensity of 9.5 m W/sq cm. Intimate relationships were observed between the initial nitrogen oxides concentrations and the rate of oxidant formation. The correlation coefficients were 0.65 for Kawasaki, 0.62 for Suginami-ward and 0.82 for Matsudo. No noticeable relationship between the initial total hydrocarbon concentration and the rate of oxidant formation could be found at Kawasaki and Suginami-ward. Analysis of the hydrocarbons by gas chromatography revealed that the reduction rate of aromatic hydrocarbons after irradiation ranged from 71.2% for o-xylene to 81.7% for toluene. A maximum aldehyde concentration was observed at 1-2 hr after the irradiation.

55270 **APTIC NO. 77139**

Takayasu, M., K. Kanzaki, Y. Annen, and Y. Morita

EFFECT OF O2 AND SO2 ON THE REDUCTION OF NO WITH NH3. *(NO no NH3 ni yoru kangen hanno ni taisuru O2 to SO2 no eikyo). Text in Japanese. Nenryo Kyokaishi (J. Fuel Soc. Japan) (Tokyo), 54(580):684, Aug. 1975.*

The effect of oxygen and sulfur dioxide on the nitric oxide reduction reaction by ammonia in the presence of copper-alumina and chromium-alumina catalysts is studied. The presence of oxygen in the reaction system promoted the NO conversion. In the Cu-alumina catalyst system, the NO conversion was 16% at 200 C without the oxygen presence, but it was 70% when oxygen was present. When the temperature was increased to 400 C, the NO conversion with the oxygen presence decreased to 60%. When SO2 was added to the system of NO-NH3-02, the NO conversion at 200 C decreased to 20% and 70% conversion could not be recovered even if the added SO2 was removed from the system, which indicated the SO2 poisoning of the catalyst activity. The formation of nitrogen dioxide occured in the system of NO-NH3-02 at the temperature above 400 C, however, no NO2 formation was observed when SO2 was present in the system.

55271 **APTIC NO. 79392**

Tarroni, G., V. Prodi, C. Melandri, G. F. Bompane, T. De Zaiacomo, and M. Formignani

PRODUCTION OF ULTRAFINE MONODISPERSE AEROSOLS BY CONDENSATION. *J. Aerosol Sci., 6(5):305-310, 1975. 10 refs.*

The production of monodisperse aerosols in the ultrafine range is described based on a general condensation scheme. The boiler is suppressed, as the material is fed directly to the reheater in the form of argon-borne particles. The reheater is either an induction plasma torch or an induction graphite oven. Volume heating of the gas and a controlled vapor concentration and cooling rate are provided. The range of particle size is 0.005-0.15 micron and overlaps with the size range produced by the conventional condensation generators. The geometric standard deviation sigma g ranges from 1.3 to 1.1. (Author abstract modified)

55272 **APTIC NO. 77189**

Tomisaki, A.

THE PRESENT CONDITION AND THE TENDENCY OF CLOSED SYSTEMATIZATION. *(Kurouzudo shisutemuka no genjo to doko). Text in Japanese. Puranto Enjinia (Plant Eng.), 7(1):35-39, Jan. 1975.*

As assessment of the open system of industrial production, the nesessity of a closed system, the mechanics of the closed system, studies done on and the technical development of the closed system are discussed. Pollution and resources, economic aspects of industrial waste, and the recovery and reuse of wastes are also reviewed.

55273 **APTIC NO. 77137**

Uchida, Hiroshi, Fumio Adachi, Osami Mori, and Ryokichi Negishi

MULTIELEMENT ANALYSIS OF AIRBORNE PARTICULATES BY LASER MICROPROBE SPECTROSCOPY. *(Reza hakko bunko ho ni yoru taiki fuyu ryushichu no tagenso bunseki). Text in Japanese. Bunseki Kagaku (Japan Analyst) (Tokyo) 24(5):325, May 1975.*

The elemental analyses of single particles of airborne particulates by laser microprobe spectrometry are described. The airborne particulates were collected onto a Mylar film using a cascade impactor at a flow rate of 9 1/min for 1 hr, from which single particles in various sizes up to 10 micron were selected for the analysis. Each particle was evaporated by a laser beam emitted from neodymium glass and excited by a high voltage spark discharge. The emission spectra of the excited particle was then photographed. Magnesium, aluminum, silicon, calcium, iron, copper, and zinc were found in particles sized in 4, 6, 8, and 10 micron in diameter. The averaged analytical results for the elemental composition in the 6 micron particles were 7.8% Mg, 18.8% Al, 29.2% Si, 18.0% Ca, 32.1% Fe, 19.6% Cu, and 20.6% Zn, however the amount of each element in the same size particle varied. The emission intensity of heavier element tended to be stronger than that of lighter elements.

55274 **APTIC NO. 79440**

Voorhoeve, R. J. H. and L. E. Trimble

REDUCTION OF NITRIC OXIDE WITH CARBON MONOXIDE AND HYDROGEN OVER RUTHENIUM CATALYSTS. *J. Catalysis, 38(1-3):80-91, June 23, 1975. 29 refs.*

A study was conducted to find how the role of ruthenium catalyst in nitric oxide reduction is linked to its preparation and pretreatment. The catalysts used were bulk ruthenium metal and variously treated samples of Ru on alumina. The catalytic properties of the catalysts were measured with a fixed bed continuous flow reactor in which 0.3 to 1 cu cm catalyst supported on a porous quartz disc was subjected to a downflow of a preheated mixture of 0.13% NO, 0.4% hydrogen, 1.3% carbon monoxide, 3% water vapor, and 3% carbon dioxide in helium. This composition was chosen to approximate the concentrations in automotive exhaust. The composition of the feed and of the effluent from the reactor were determined by analyzing dried samples by gas chromatography. Two peaks in the ammonia yield are distinguished: a CO-assisted NH3 maximum at approximately 270 C and a H2-assisted NH3 maximum at approximately 350 C. The CO-assisted mechanism becomes increasingly important as the Ru particles become smaller. The dual nature of Ru catalysts may be due to heavy coverage of the Ru surface with nitrogen in the reduced state and to partial coverage with oxygen in the oxidized state. (Author abstract modified)

55275 **APTIC NO. 79436**

Williamson, Ashley D. and J. L. Beauchamp

ION-MOLECULE REACTIONS OF NO+ WITH ORGANIC MOLECULES BY ION CYCLOTRON RESONANCE SPECTROSCOPY. *J. Am. Chem. Soc., 97(20):5714-5718, Oct. 1, 1975. 37 refs.*

Ion cyclotron resonance techniques are used to study the reactions of nitric oxide cation with various organic molecules in the gas phase. Nitric oxide cation reacts with acetaldehyde and isobutane by hydride transfer, yielding with the methyl carbonyl cation and the trimethyl carbonium ion, respectively. Association of NO+ with an organic halide leads to the formation of a chemically activated species which may dissociate to the reactants or, when exothermic, to a nitrosyl halide and a carbonium ion (halide transfer). In some cases the intermediate is also observed to eliminate hydrogen halide to give an alkene, with NO+ remaining bound to either species in the products. Transfer of the NO+ from these products to various pi- and n-donor bases occurs readily. The activated complex formed by the reaction of NO+ with alcohols does not follow the pattern of the organic halide reactions; rather it decomposes instead by transfer of hydroxyl anion or an alpha hydride to NO+. The important factor in reactions of NO+ is its Lewis acid character.

1974

55276 **APTIC NO. 76959**

Akimoto, H.

RECENT PROGRESS AND PROBLEMS IN THE STUDIES OF ATMOSPHERIC CHEMICAL REACTIONS. REACTIONS OF THE NOX-HYDROCARBON SYSTEM. *(Taiki kagaku hanno kenkyu no saiken no shinpo to mondaiten. Nox-tankasuisokei no hanno). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 9(2):91-94, Nov. 1974. 4 refs.*

The reaction between nitrogen dioxide and olefins is reviewed. The cis-trans isomerization reaction of olefins by NO2 strongly suggests that the first step of the reaction is the formation of a nitro radical which is captured by oxygen in air. The rate constants for the addition reaction of NO2 with olefins are 0.053, 0.031, 0.359, and 0.301 l/mole sec for ethylene, propylene, 1-butene, and iso-butene, respectively. The rate of addition found from these data is 0.01-0.1 ppb/day when both the NO2 and olefin concentrations are 1.0 ppm. A number of radicals are present in photochemically polluted atmosphere and play an important role in various reactions. However, the identification of the radicals is very difficult because the concentrations of these are very low. Various radicals confirmed recently include: oxygen, hydrogen, hydroxyl, peroxyl, methyl, methoxy, and carbonyl radicals. The identifications were made with resonance absorption, resonance fluorescence, ultraviolet absorption, and laser methods. Most of the reaction constants for reactions between OH, O, and ozone and ethene, propene, benzene, toluene, propane, and butane are now known.

55277 **APTIC NO. 79397**

Aubert, J.

MARINE AEROSOLS, VECTORS OF MICROORGANISMS. *(Les aerosols marins, vecteurs de microorganismes). Text in French. J. Rech. Atmospheriques, 8(3-4):541-554, July-Dec. 1974. 11 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice France, Oct. 4-10, 1973.)*

The presence of microorganisms in marine aerosols was investigated. Marine aerosols are able to carry microorganisms from the surface layer of the sea. An abundance of terrestrial bacteria, particularly coliforms, is found in seashore polluted areas. In offshore areas, marine microorganisms differ according to aerosol origin such as intercontinental sea (Mediterranean sea) or oceans. An in-vitro study shows the presence of some antibiotic substances of sea water in the marine aerosols.

55278 **APTIC NO. 79325**

Baier, R. E., D. W. Goupil, S. Perlmutter, and R. King

DOMINANT CHEMICAL COMPOSITION OF SEA-SURFACE FILMS, NATURAL SLICKS, AND FOAMS. *J. Rech. Atmospheriques, 8(3-4):571-600, July-Dec. 1974. 58 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

The dominant chemical composition of sea-surface films, natural slicks, and foams was investigated using nondestructive direct analytical techniques. Ambient air/water interfaces are usually coated with films of glycoproteins and proteoglycans, ranging in thickness from 100 to 300 A, negatively charged, and exhibiting moderate surface free energies. Natural sea slicks are dominated by glycoproteins and proteoglycans, but are more closely packed and coherent. They are of biological exudate origin. The reported dominance of planktonic lipids is not confirmed. Pollutant slicks are dominated by aliphatic and highly esterified oils. There are no qualitative chemical differences, but there are some quantitative differences. Sea foams are dominated by glycoproteins and proteoglycans, and are stabilized by silica-dominated particulate debris. (Author abstract modified)

55279 **APTIC NO. 79034**

Bailey, A. B. and H. M. Powell

FORMATION OF MIXED MOLECULAR CLUSTERS IN FREE-JET EXPANSIONS (FINAL REPORT). *ARO Inc., Arnold Air Force Station, Tenn., Air Force Proj. 6687, Program Element 62101F, Rept. AEDC-TR-74-39, 44p., Sept. 1974. 16 refs.*

NTIS, DDC: AD 785347

The formation of mixed molecular clusters in free-jet expansions was studied to obtain information on the concentrations of jet engine pollutants in the stratosphere. A simulation of jet engine exhaust emissions was accomplished by expanding various gas/water mixtures from a molecular beam source and mass analyzing the resulting molecular beam. Clusters of the following types were produced: positive nitrogen species, positive nitric oxide species, positive carbon dioxide species, positive sulfur dioxide species, positive methane species, combinations of the above species with water molecules, combinations of nitrogen and sulfur dioxide or nitric oxide cations, nitric oxide cation-nitrogen-water species, nitric oxide cation-sulfur dioxide-water species, carbon dioxide cation-sulfur dioxide species, and nitric oxide cation-carbon dioxide species. No sulfates were detected. The purpose of nitrogen in the gas mixtures was to simulate the major air fraction of the jet exhaust.

55280 **APTIC NO. 77173**

Biswas, A. K. and N. C. Roy

THE KINETICS OF REDUCTION OF SULPHUR DIOXIDE GAS ON CYLINDRICAL COKE PELLETS. *Australian Chem. Eng., 15(11-12):5-10, Nov.-Dec. 1974. 12 refs.*

A thermogravimetric method is used to study the kinetics of sulfur dioxide reduction on cylindrical coke pellets. Activated adsorption and linearly advanced reaction front models are applied to the experimental data to yield values of activation energy and reaction order with respect to the partial pressure of the SO2 gas. The latter model gives the best fit for the experimental data and hence is accepted. At higher temperatures, the influence of mass-transport becomes relatively prominent with a decrease in chemical resistance.

BASIC SCIENCE AND TECHNOLOGY

55281 **APTIC NO. 79318**

Blanchard, Duncan C.

INTERNATIONAL SYMPOSIUM ON THE CHEMISTRY OF SEA/AIR PARTICULATE EXCHANGE PROCESSES: SUMMARY AND RECOMMENDATIONS. *J. Rech. Atmospheriques, 8(3-4):509-513, July-Dec. 1974. 19 refs. (Presented at the International Symposium on the Chemistry of Sea/Air Particulate Exchange Processes, Nice, France, Oct. 4-10, 1973.)*

Sources of marine particles and sea/air particulate exchanges processes are discussed. Topics covered include the composition of sea surface monolayers, the importance of dissolved organic material in the sea, secondary particle production and enrichment at the phase change, insoluble dust, and particle residence time. Most particulate material in the marine atmosphere far removed from the continents is not produced by the sea. Even in remote regions of the oceans, especially over the tropical Atlantic, the dust loading of the atmosphere exceeds that of the ocean derived material. These dusts, originating from the desert regions of the world, make it difficult to understand and interpret aerosol chemistry. Continued pollution of the oceans and fresh water bodies of the earth produce profound changes in these surfaces and in the chemistry and biology of the water to air transfer of particulate material. Increased pollution of the water brings about a pollution of the atmosphere.

55282 **APTIC NO. 77150**

Goldberg, E. D.

MEASUREMENT OF POLLUTION HISTORY. *Environ. Health Perspect., vol. 9:179-180, Dec. 1974. 1 ref.*

A method for measuring the history of pollution exposure levels in the environment based on the introduction of a time-clock to glacial, lacustrine, and marine sediments is described along with its application to the study of lead levels in the Southern California coastal area. The technique involves the use of Pb-210 which decays with a half-life of 22 yr. This Pb isotope enters surface waters unsupported by its parents in the uranium-238 series, and it is rapidly removed to the sediments where its decay can be measured over an interval of about 100 yr. Yearly strata can be identified, and the dating technique allows for the development of a historical record of environmental levels for those materials introduced to the atmosphere or water as pollutants and rapidly sedimented. Sedimentary records for the Southern California coast indicate that Pb levels in the area have increased by a factor of 10 over the past 20 yr.

55283 **APTIC NO. 79347**

Nakagawa, S.

DECOMPOSITION AND REMOVAL METHOD OF NOX. *(NOx no Bunkai Jokyo). Text in Japanese. Sekiyu Gakkai Shi (J. Japan Petroleum Inst.) (Tokyo), 17(5):392-396, May 1974.*

A method of decomposition and removal of nitrogen oxides from stack gas has been studied by use of the Small Scale Gas-Liquid Close Contact System (TOPCA L-2) which was developed by Japan Engineering and Consulting Co., Inc. In order to find the best reducing agent, several different compositions of mixtures of sodium sulfate, sodium bisulfate, ammonium sulfate, and ammonium bisulfate were examined. Solutions with pH 6.4 to 10 of Na2SO3 and NaHSO3 did not induce an occurrence of sulfur dioxide gas, and the cracking rate of NOx was in the range of 93.4-95.2%. The higher decomposition rate was obtained at the lower temperature of gas and reducing agent. The decomposition rate did not depend on the flow rate of sample gas within the eigen limit of gas flow which was provided by the used rotator. Depth of the agent in the decomposition cylinder did not induce any significant effect on the decomposition rate in the range from 18.5 cm to 44.5 cm.

55284 **APTIC NO. 79698**

Reinisch, Ronald F.

PHOTOCHEMICAL SMOG KINETICS AND HYDROCARBON REACTIVITY. *National Science Foundation, Washington, D. C., Research Applied to National Needs, Trace Contam. Conf. Proc., Annu., 2nd, Pacific Grove, Calif., 1974, p. 54-58. 6 refs. (Aug. 29-31.)*

A photochemical smog formation model is developed and compared with smog chamber data. The model assumes that the reactivity of a complex mixture of hydrocarbons may be taken as a summation defined as the propylene-equivalent-concentration. This approach, assuming that the mixture is ideal, allows hydrocarbon mixtures to be treated as a single hydrocarbon species having the overall chemical reactivity of propylene. The model predictions show acceptable agreement with smog chamber data on ozone and formaldehyde production. The predicted value for peroxyacetyl nitrate formation is an order of magnitude low for smog chamber experiments utilizing butene as the hydrocarbon. Satisfactory agreement is also obtained between the model predictions and automobile exhaust measurements of oxidant (mainly ozone). Computer levels of PAN are again one order of magnitude low.

55285 **APTIC NO. 79357**

Takematsu, Toshiichi, Kazuo Shimada, Yasunori Kuriki, Satoshi Ohshima, Morio Suzuki, and Jun Kato

HYDROCRACKING IN THE DEEP-DESULFURIZATION OF HEAVY-OIL. *Text in Japanese. Nippon Kagaku Kaishi (J. Chem. Soc. Japan), 8(12):2384-2390, 1974.*

Hydrocracking of the residue occurring simultaneously with the hydrodesulfurization of Khafji atmospheric residue over a cobalt-molybdenum-alumina catalyst in a fixed bed cocurrent up-flow reactor was studied under the following experimental conditions: total pressure, 50 to 200 kg per sq cm; temperature, 400 to 460 C; LHSV equal to 1 to 6; and hydrogen to oil ratio, 500 to 3000. The values indicating the extent of hydrocracking changed markedly near the point of 85% to 90% desulfurization except for viscosity. This observation suggests that rapid hydrocracking reaction occurred in the region of desulfurization above 85 to 90%. The hydrocracking reaction appears to be second order in the region of comparatively low desulfurization, which agrees well with that of the hydrodesulfurization reaction. The reaction was first order in the region of higher desulfurization, where the effect of desulfurization reaction on hydrocracking can be eliminated, which is considered to be proper as the reaction order of hydrocracking of the heavy oil. The reaction rate of hydrocracking appears to have a maximum value at around 150 kg per sq cm pressure. Probably the hydrogen consumption has a linear correlation with the fractional ratio of hydrocracking. (Author abstract)

55286 **APTIC NO. 78987**

Voorhoeve, R. J. H., J. P. Remeika, and L. E. Trimble

NITRIC OXIDE AND PEROVSKITE-TYPE CATALYSTS: SOLID STATE AND CATALYTIC CHEMISTRY. *Preprint, General Motors Corp., Detroit, Mich., 36p., 1974. 34 refs. (Presented at the Catalytic Chemistry of Nitrogen Oxides Symposium, Oct. 7-8, 1974.)*

The solid state properties and catalytic chemistry of perovskite-type compounds were investigated in relation to nitric oxide reduction. The following properties were found to be important in catalytic NO reduction: the presence of mixed valence ions (e.g., manganese(III)/Mn(IV); the binding of oxygen in the crystal lattice; and the binding of nitrogen- containing fragments to the surface of the catalyst. Both molecular and dissociative chemisorption of NO appeared to contribute to the reduction of NO on the catalyst surface. The importance of mixed valence and binding of lattice oxygen was apparently linked to the simultaneous presence of cation vacancies and oxygen vacancies. The systematic substitution of cations in the dodecahedral and octahedral positions of the perovskite structure was used to demonstrate the importance of the solid-state chemistry in relation to catalytic activity and selectivity. (Author abstract modified)

55287 **APTIC NO. 75910**

Yagodosvkiy, V. D., Y. A. Zubarev, and A. F. Volkov

ADSORPTION OF GASES ON NICKEL FILMS AND PLATES STUDIED BY A FERROMAGNETIC RESONANCE METHOD. *(Izucheniye adsorbtsii gazov na plenkakh i plastinkakh metodom ferromagnitnogno rezonansa). Kinetika i Kataliz (Kinetics and Catalysis), 15(4):1039-1044, 1974. 18 refs. Translated from Russian, 12p.*

The adsorption of ammonia, formic acid, and nitrous oxide on nickel films and plates was studied by observing the ferromagnetic resonance spectra at 23 C. Increases in the intensity of the spectral lines were associated with the adsorption of NH3 and CH2O2 and with the dissociative absorption of N2O on nickel films. Adsorption of NH3 resulted in an increase in the half width of the spectral lines, while CH2O2 adsorption exerted the opposite effect. Nitrous oxide adsorption showed no effect on line width. The data were interpreted in terms of an exchange reaction model.

55288 **APTIC NO. 77249**

Japan Automobile Research Institute, Inc.

JAPAN AUTOMOBILE RESEARCH INSTITUTE TECHNICAL REPORT: DEVELOPMENT OF A SIMULATION MODEL FOR PHOTOCHEMICAL AIR POLLUTION. *(Nippon Jidosha Kenkyusho Kenkyu Hokoku (Kokagaku Taiki Osen Simulation Model no Kaihatsu)). Text in Japanese. Nippon Jidosha Kenkyusho (Japan Automob. Res. Inst. Inc.), no. 16:1-58, Oct. 1974.*

A simulation model for photochemical air pollution was developed based on the finite difference solution of the equations of conservation of mass. Ten chemical species, divided into three groups, were used in the reaction model. The first group included nitric oxide, nitrogen dioxide, ozone and hydrocarbon, the second group O radical, OH radical, ROx radical and HNO2, and the third group nitric acid and peroxyacetyl nitrate. The kinetic parameters for the reactions were estimated by a program using smoke chamber irradiation as a model. Various initial conditions were used until the best calculation results were obtained. The validation of a proposed reaction mechanism of the photochemical reaction was verified. Application of the simulation model to the Tokyo area resulted in satisfactory photochemical air pollution prediction.

1973

55289 **APTIC NO. 77192**

Sindo, Kotaro

SEVERAL PROBLEMS IN THE NUMERICAL ANALYSIS OF CHEMICAL REACTION RATE EQUATIONS-PHOTOCHEMICAL SMOG SYSTEM. *(Kagaku hanno sokudoshiki no suchi kaiseki no okeru 2, 3, no mondaikokagak summoggu no kei). Text in Japanese. Tokyo Toritsu Aisotopu Sogo Kenkyusho Nenpo (Tokyo Met. Isotope Gen. Res. Inst. Annu. Rept.), p. 45-46, July 1973.*

Chemical reactions which are represented by systems of linear differential equations are studied. Numerical solutions using the Runge-Kutta method are found by expressing the solution at time (t + th) by means of the solution time (t). Thus, the size of (h) is particularly important. Chemical reactions is photochemical smog, which consist only of inorganic compounds, atomic oxygen, nitrous oxide, nitric anhydride, nitrogen trioxide, nitric oxide, ozone, nitrogen dioxide, nitrous acid, nitric acid, hydroxide, nitrogen gas, oxygen gas were studied. The relative truncation error is estimated. The value of (h) is then determined to obtain a stable solution. Furthermore, if it is assumed that either O, N2O4, and N2O5 are in the stationary state, or NO3 O, N2O4 and N2O5 are in the stationary state, then the same reaction occurs. The former reaction, however, takes 1000 times as long as the latter. Moreover, if the stationary state method is not applied the latter reactions takes ten to the fifth power times as long.

1972

55290 **APTIC NO. 79081**

Korfel, Marek

THE USE OF COMPUTER FOR ANALYSIS AND SYNTHESIS OF THE COMBUSTION GAS FLOW IN COMBUSTION FURNACES. *(Zastosowanie maszyn cyfrowych do analizy i syntezy ciagow spalin plomiennych pelcow hutniczych). Text in Polish. Prace Inst. Hutniczych, no. 6:369-378, 1972. 14 refs.*

A description is given of a network method for calculation of the combustion gas flow in combustion metallurgical furnaces. The formulae presented permit the calculation of the network points arranged in series. The method of calculation of branchings of the combustion gas flow and of border conditions is discussed. The described method should be used when there is leakage in the combustion gas flow, drop of temperature of great magnitude, and a branched flow system. (Author abstract)

EFFECTS-HUMAN HEALTH

1975

55291 **APTIC NO. 77129**

Barltrop, Donald

CHEMICAL AND PHYSICAL ENVIRONMENTAL HAZARDS FOR CHILDREN. *Postgrad. Med. J. (London), 51(Suppl. 2):11-15, 1975. 18 refs.*

The term environment is used to mean the sum of external influences affecting the child. Examples of the numerous environmental factors that may affect the health and well-being of the child are provided, including neonatal hazards, pica, environmental deficiencies, radioactive hazards, falls, and motor vehicle accidents. A case is described in which lead poisoning was clearly related to the ingestion of contaminated soil. Children may be at risk from contaminated soils and dusts arising from the deposition of lead particulates from motor vehicle exhausts and from the stack emissions of lead smelters.

55292 **APTIC NO. 79523**

Begishev, A.

STUDIES ON THE TOXICITY OF IODINE VAPORS AT HIGH AIR TEMPERATURE (EXPERIMENTAL DATA). *(Materialy po kharakteristke toksichnosti parov yoda v usloviyakh povyshennoy temperatury vozdukha (eksperimental nye dannye)). Text in Russian. Gigiena Truda i Prof. Zabolevaniya, no. 6:38-41, 1975. 5 refs.*

The acute and chronic toxicity of iodine vapors was studied in albino rats and guinea pigs at normal and elevated temperatures (33-34 C). The acute threshold concentration was 30 mg/cu m, and the irritative threshold concentration was 10 mg/cu m. Chronic exposure for 4 hr daily, 5 days/wk for 4 mo at 33-34 C showed that concentrations around the current MAC value of 3 mg/cu m cause chronic poisoning, which manifests itself in nervous and renal disorders, respiratory disturbances, and in functional disturbances of the thyroid gland. The MAC value is recommended to be set at 0.3-0.5 mg/cu m.

55293 **APTIC NO. 77090**

Bell, Karl A., S. K. Friedlander, and W. M. Keck

EXPERIMENTAL MEASUREMENTS OF AEROSOL DEPOSITION IN A MODEL OF A LUNG BIFURCATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 16 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-50.2.)*

Experiments designed to characterize particle deposition patterns or hot spots at airway bifurcations were conducted in a model simulating the first bifurcation of the human lung. The deposition patterns, as depicted by computer-plotted maps with contours of constant transfer coefficients, were strikingly different for particles in the diffusion and impaction subranges. Curves of transfer coefficients over the 0.088 to 5.7 micron diameter range were similar in form to those for the deposition efficiency in the entire lung and for the collection efficiency of fibrous filters. The highest local dosage occurred near the carina and, depending on particle size, was an order of magnitude or more greater than the deposition at the end of the branch. Epithelial cells lining the lung wall near the carina received 25 times more 5.7 micron particles than the average over the branch. The corresponding figure fell to 3.8 as the particle size was reduced to the diffusion range. Although approximately 10 times more cigarette particles deposited in the pulmonary region than in the tracheobronchial tree, the dosage within the hot spots near the carina of each bifurcation in the large airways was 50 times greater than the average dosage in the pulmonary region. Deposition patterns and efficiencies for 1.1 micron particles were significantly different for unsteady and steady inhalations at the same time-averaged flow rates. (Author abstract modified)

55294 **APTIC NO. 79539**

Bignon, J. and P. Sebastien

PARTICULATE AIR POLLUTION AND HEALTH: AGGRAVATING HAZARDS OF CANCER DUE TO ASBESTOS? *(Pollution atmospherique particulaire et sante: le risque de cancer asbestosique devient-il menacant)? Text in French. Gaz. Med. France (Paris), 82(17):2017-2019, May 1975.*

Industrial and general epidemiological data on the carcinogenic action of asbestos are presented. Asbestos, apart from being a carcinogen due to its mechanical irritating action on the target cells, is a cocarcinogen for other chemical carcinogens, such as components of cigarette smoke due to its large specific surface. Eighty percent of all mesotheliomas in occupationally exposed subjects were found to be due to asbestos. The hazards of asbestos are no longer limited to occupationally exposed subjects, as demonstrated by the increased incidence of mesotheliomas and of asbestos bodies in the general population, especially in people living in the vicinity of asbestos processing plants. Fireproof asbestos insulation inside modern buildings represents the major exposure hazard, while asbestos released by brake linings is negligible. The epidemiological findings indicate that the use of asbestos should be restricted.

55295 **APTIC NO. 79320**

Clayton, Barbara E.

LEAD: THE RELATION OF ENVIRONMENT AND EXPERIMENTAL WORK. *Brit. Med. Bull., 31(3):236-240, Sept. 1975. 66 refs.*

Data on atmospheric concentrations of lead and its sources are summarized. Concentrations of Pb are higher in the air of cities than in the country and can reach 2-3 micrograms/cu m in downtown and industrial areas. Concentrations in rural areas are less than a third of this. There are particularly high concentrations in the immediate vicinity of traffic. Lead inhibits many of the enzymes involved in heme synthesis and may inhibit globin synthesis and the incorporation of iron into protoporphyrin. Fluorometric measurement of zinc protoporphyrin may provide a suitable primary screening test for the effects of chronic lead absorption. Increased blood lead levels have been linked to mental retardation and hyperactivity. The placental transfer of lead in humans begins in the 12th wk of pregnancy and fetal concentrations increase throughout pregnancy. Animal studies on lead teratogenicity are reviewed but no such data exists for humans.

55296 **APTIC NO. 79331**

Cumbrowski, J. and W. Raffke

CADMIUM - A HEALTH HAZARD IN THE HUMAN ENVIRONMENT. *(Cadmium - Ein Schadfaktor in der menschlichen Umwelt). Text in German. Z. ges. Hyg. Ihre Grenzgebiete (Berlin), 21(1):1-7, 1975. 68 refs.*

Studies and observations on the environmental hazards, sources, toxicology, and trace quantities of cadmium in soil, water, air, and food are reviewed along with the principal analytical methods. The average background concentration of cadmium in the air of non-polluted areas is 0.001 microgram/cu m, while the concentrations are about a factor of 10 higher in inhabited and industrial areas. The galvanic industry, metallurgy, fertilizers, pesticides, tobacco, fuel oil, municipal wastes, and motor vehicles are the chief sources of cadmium as an environmental pollutant. Cadmium contents of 220-1820 ppb were found in soil samples near a busy highway. Cadmium is resorbed in the lungs when inhaled in the form of particles ranging from 0.01 to 5 microns in size. The cadmium resorbed in the lungs is transported to the liver where it forms metalthionine-protein complex, and the free cadmium present in the organism stimulates the synthesis of the protein complex in the liver and kidney. The cadmium bound in the liver is then transferred to the kidney. The half-life period of elimination of cadmium from the lungs amounts to about 5 days. Unlike subjects handling cadmium or those living near cadmium processing plants, the general population is not exposed to any real hazard due to cadmium in the air. Teratogenic damages, such as hydrocephalia, ectopic kidneys, and vascular defects, renal damages, proteinuria, microcytic hypochromic anemia, and carcinoma of the testis and prostate were observed in animals and humans after exposure to cadmium.

55297 **APTIC NO. 77021**

Dehnen, Walter

STUDIES ON THE METABOLISM OF BENZO(A)PYREN IN ALVEOLAR MACROPHAGES. *I. UPTAKE OF BENZO(A)PYRENE AND INDUCTION OF BENZO(A)PYRENE HYDROXYLASE. (Untersuchungen ueber den Metabolismus von Benzo(a)pyren in Alveolarmakrophagen. I. Aufnahme von Benzo(a)pyren und Induktion der Benzo(a)pyren-Hydroxylase). Text in German. Zentralbl. Bakteriol. Hyg. Infektionskr. Abt. Orig. B., 160(3):191-211, 1975. 51 refs.*

Experiments concerning the uptake of benzo(a)pyrene and the activity of the metabolizing enzymes are discussed. The alveolar macrophages were obtained by lung lavage from guinea pigs. The uptake of benzo(a)pyrene in the macrophages was measured by a microfluorimetric method in single cells and by using labelled substrate. The uptake was terminated in 1-2 hr. The kinetics of uptake and elimination were influenced by the concentration of serum and benzo(a)pyrene in the medium. The activity of the metabolizing enzymes (benzo(a)pyrene hydroxylase and aryl hydrocarbon hydroxylase) increased during incubation with benzo(a)pyrene and was dependent on the concentration of benzo(a)pyrene in the growth medium. The enzyme activity was also inducible by other polycyclic hydrocarbons. Induction was inhibited by actinomycin D and cycloheximid. Enzyme activity in guinea pigs is comparable to the activity in human leucocytes and alveolar macrophages.

55298 **APTIC NO. 79365**

Deleanu, M., I. Lenghel, N. Moldovan, and N. W. Ghelberg

MORBIDITY THROUGH A SERIES OF AFFECTIONS IN THE POPULATION FROM AN INDUSTRIAL CENTRE FOR NON-FERROUS METALLURGY AND CHEMIS-

TRY. (Morbiditatea printr-o serie de afectiuni la populatia dintr-un centru cu industrie de metalurgie neferosasa si de chimie). Text in Romanian. Igiena (Bucharest), 24(3):173-177, July-Sept. 1975. 7 refs.

Incidences of morbidity were determined in a population from an industrial center for non-ferrous metallurgy and chemistry and compared to three control urban localities. Differences in the industrial center are 2.5 times higher in adults for psychological disease, chronic diseases of the central nervous system, liver diseases, disturbances of the gall bladder, allergic diseases, endocrine and metabolic diseases, and diabetes. In children differences two times higher are noted for psychological disturbances, diseases of the eye, allergic, endocrine, metabolic, and nutritional diseases, and diseases of the intestine.

55299 **APTIC NO. 79502**

Elegbeleye, O. O.

BRONCHIAL CARCINOMA IN NIGERIANS. A REPORT OF SIX CASES. *Trop. Med., 78(3):59-62, March 1975. 15 refs.*

Descriptions of six cases of bronchial carcinoma among Nigerians (five males and one female, ages 28-74 yr) are presented along with epidemiological evidence pointing to the rarity of the disease in Nigeria. There are two nonsmokers and four heavy smokers among the six cases examined. The latter belonged to the high class of Nigerian society whose way of life is similar to that of the European population which, like other developed peoples, has experienced a formidable rise in mortality from bronchial carcinoma over the last 30 yr. The generally low incidence of bronchial carcinoma in Nigeria appears to be due to relatively little contact with external carcinogens found in cigarette smoke and air pollution.

55300 **APTIC NO. 76985**

Endo, R., S. Nagaoka, and K. Takemoto

EFFECTS OF AIR POLLUTION ON AVIAN RESPIRATORY SYSTEM. *(Taiki- osen no tori-kokyuki no oyobosu eikyo). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept., Tokyo Met. Res. Inst. Environ. Prot.), vol. 6:268-269, 1975.*

The effects of air pollution on the respiratory system were examined in 2 groups of doves, 541 of which came from the polluted Tokyo and Kawasaki areas, and 103 of which came from non-polluted areas around Tokyo. Lung sections were made for pathohistological examination. The degree of pollution in their lungs was respresented by the amount of sedimented dust and its aggregation state in the alveolar sacs. The degree of fiber formation was also considered. The results of the examination showed that thee degree of pollution in the lungs was higher in polluted areas. Moderate and heavy pollution was 27.7% in Tokyo, 24.4% in Kawasaki, compared to 7% in areas around Tokyo, mainly residential zones. The degree of pollution in the lung also increased with age only in the polluted area.

55301 **APTIC NO. 77014**

Folinsbee, L. J., F. Silverman, and R. J. Shephard

EXERCISE RESPONSES FOLLOWING OZONE EXPOSURE. *J. Appl. Physiol., 38(6):996-1001, June 1975. 33 refs.*

The response of 28 young healthy adults to a three-stage ergometer test following ozone exposure at levels of 0.37, 0.50, or 0.75 ppm for 2 hr either at rest or while exercising intermittently was measured. Neither submaximum exercise oxygen consumption nor minute ventilation was significantly altered following any level of O3 exposure. The major response noted was an increase in respiratory frequency during exercise following O3 exposure. The increase was closely correlated with the total O3 dose and was accompanied by a decrease in tidal volume so that minute volume was unchanged. The irritant properties of O3 appeared to modify the normal ventilatory response to exercise, with the effect being dose dependent. (Author abstract modified)

55302 **APTIC NO. 79319**

Frank, Robert

ARE AEROSOL SPRAYS HAZARDOUS? *Am. Rev. Respirat. Disease, 112(4):485-489, Oct. 1975. 27 refs.*

The hazardous effects of aerosol sprays are discussed. The three essential components of aerosol sprays are the propellant, the solvent, and the active ingredient. Each component may be hazardous to health. The most common propellants are the fluorochlorohydrocarbons. Approximately 90% or more of the aerosol weight is in particles greater than several micron in diameter. These particles, once inhaled, deposit principally in the head or more central airways of the chest. The submicronic particles, representing 10% or less of the total mass, deposit principally in the small airways and alveolar regions. The chief adverse effect of the fluorocarbons is on the heart. They may depress myocardial contractility, disturb myocardial conduction, and sensitize the myocardium to sympathomimetic amines. Increased mortality from asthma in [illegible] last decade may be due to the increased use of hand nebulizers (this may be due to their high concentration of isoproterenol). Respiratory difficulties associated with exposure to hair sprays are also discussed. The fluorocarbons also pose a hazard to the environment in that they lead to a reduction of ozone in the stratosphere.

55303 **APTIC NO. 76930**

Hayashi, Kenji

EXPERIMENTAL STUDY ON THE EFFECTS OF AIR POLLUTION ON THE ONSET OF BRONCHIAL ASTHMA. *(Taikiosen no kikanshi zensoku hassho ni oyobosu eikyo ni kansuru jikkenteki kenkyu). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 22(6):325-332, June 1975. 34 refs.*

Experimental studies were carried out for the elucidation of the effect of air pollutants on the onset of asthma was studied in female guinea pigs of the Hartley strain. After sensitization of the animlas via the inhalation of 2% egg-white albumin, the amount of histamine in the sensitized animal s lung significantly increased. Exposure of the sensitized animal to nitrogen dioixde at 10 ppm 5 hr/day for 3 days or to ozone at 1 and 5 ppm 3 hr/day for 3 days significantly reduced the amount of lung histamine and the number of lung mast cells. Exposure of nonsensitized animals to the pollutants did not significantly reduce the above parameters. The distribution of lung mast cells after exposure to ozone showed a relatively increased ratio as compared to the subpleural area (increase not significant); while exposure to NO2 showed no such tendency. A tendency of accentuation of histamine susceptibility was observed in animals exposed to NO2 as compared to those not exposed; however, the tendency was insignificant). Nitrogen dioxide exposure affected antibody formation in sensitized animals, while ozone exposure did not.

55304 **APTIC NO. 79422**

Hazucha, M. and D. V. Bates

COMBINED EFFECTS OF OZONE AND SULPHUR DIOXIDE ON HUMAN PULMONARY FUNCTION. *Nature (London), 257(5521):50-51, Sept. 4, 1975. 5 refs.*

The combined effect of exposure to 0.37 ppm ozone and 0.37 ppm sulfur dioxide on human pulmonary function was investigated in non-smoking male subjects. The largest decrease in maximal mid-expiratory flow rate was from an initial value of 7.93 l/sec to 2.78 l/sec at the end of 2 hr of exposure, and the smallest reduction was from a control value of 8.74 l/sec to 7.98 l sec after 2 hr. Other measurements of ventilatory function computed from either expiratory flow-volume curves or spirograms also decreased progressively during the same 2 hr experiments. The forced expiratory volume in 1 sec decreased to 78% of its initial value at the end of 2 hr when both gases were present. The mid-expiratory flow rate, at 50% of vital capacity, decreased to 54% of its initial value in this atmosphere and the peak expiratory flow rate decreased to 79% of its initial value. The vital capacity, measured aa a static, non-forced parameter of function was 92% of its initial value at the end of 2 hr exposure for the group as a whole. The decrease in the flow measurements was proportionately much greater than the decrease in static volume.

55305 **APTIC NO. 77010**

Henderson, Brian E., Robert J. Gordon, Herman Menck, Jennie Soohoo, Susan P. Martin, and Malcolm C. Pike

LUNG CANCER AND AIR POLLUTION IN SOUTHCENTRAL LOS ANGELES COUNTY. *Am. J. Epidemiol., 101(6):477-488, 1975. 29 refs.*

An increased rate of lung cancer was consistently observed from 1968-1972 among males in the southcentral Los Angeles region. The excess risk occurred across several social classes and occupational categories; and no differential excess of oral cavity, pancreatic, laryngeal, and bladder cancer was observed in the same area, lessening the possibility that region variations in smoking habits accounted for the excess lung cancer. Air quality measurements revealed an excess of certain polynuclear aromatic compounds in southcentral Los Angeles. There was also a correlation between the geographic distribution of lung cancer cases and the general location of industries emitting polynuclear aromatic compounds. A case-controlled study of smoking, occupational history, and residential history in the area is underway. (Author abstract modified)

55306 **APTIC NO. 79321**

Higgins, I. T. T.

IMPORTANCE OF EPIDEMIOLOGICAL STUDIES RELATING TO HAZARDS OF FOOD AND ENVIRONMENT. *Brit. Med. Bull., 31(3):230-235, Sept. 1975. 24 refs.*

The role of epidemiology in the evaluation of chemical hazards is discussed. Examples of the use of epidemiology include experimental studies on illness associated with gross contamination and with exposure to low concentrations of chemicals; water hardness and cardiovascular disease; enivronmental causes of cancer; environmental exposures and congenital malformations; and environmental exposures and associations between cancer and congenital malformations. In a specific study of the potential importance of exposure to cadmium as a cause of cardiovascular disease, the concentration of Cd in the air of 28 cities was correlated with death rates. The positive correlations are specific for the chemical. Since the Cd that is inhaled is a small fraction of that which is ingested, even after allowing for different rates of absorption, it is unlikely that Cd concentrations in ambient air exert much influence on body Cd.

55307 **APTIC NO. 77171**

Huber, Gary L.

SMOKING AND NONSMOKERS - WHAT IS THE ISSUE? *New Engl. J. Med., 292(16):858-859, April 17, 1975. 10 refs.*

The effect of passive tobacco smoke inhalation on the nonsmoker is discussed. Sidestream smoke of the burning cigarette is the primary source of exposure to the nonsmoker, representing about 50% of the tobacco burned and responsible for about two thirds of the aerosol particles delivered to the environment. Acute effects of short-term exposure to environmental tobacco smoke in population studies are not presently evaluated in adequate depth, and no chronic studies are reproted for adults. Data do suggest an increasing prevalence of acute respiratory disease in young children whose parents smoke. Carbon monoxide concentrations in nonsmokers exposed to tobacco smoke are far below levels that are of known health hazard, and the potential effects of other smoke components on nonsmokers are conjectural. Hypersensitivity reactions to tobacco in the nonsmoker require more clarification.

55308 **APTIC NO. 76982**

Ikematsu, T., S. Nakazawa, R. Endo, S. Nagaoka, H. Saito, and S. Umemura

AIRR POLLUTION AND TONSIL PART 1. EFFECTS ON OZONE-EXPOSURE ON RABBIT S TONSIL, AND STUDIES ON THEIR PATHOHISTOLOGY. *(Taikiosen to hento, Part 1. Ozone bakuro no kato-hento ni oyobosu eikyo ni tsuite, sono byori soshikigakuteiki kenkyu). Text in Japanese. Tokyo-to Kagai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol.6:273-277, 1975.*

Male and female non-SPF Dutch rabbits of ages 3 and 12 months were exposed to ozone at 5 ppm at 25 C, RH of 40-60% for 3 hr. They were killed after 24 hr, 3, 7 and 14 days of the exposure by blood-letting. Their tonsils were removed for electronmicroscopic examination after double staining. Large amounts of lymphocyte infiltration and ablation of epithelial cells and mucous, energetic intraepithelial movement of lymphocytes, thickening of epithelial cells and epithelial ablation of cryptae tonsillares, lymphocytic infiltration around the blood vessels, and swelling of endothelial cells beneath the epithelium were observed. The rabbits exposed to ozone manifested some tonsillary inflammation prior to exposure. However, the response after the exposure was stronger. Tonsils located in the inlets of the digestive tracts and airways came in contact with exogenous matter such as bacteria and viruses, as well as air pollutants.

55309 **APTIC NO. 76986**

Ikematsu, T., S. Nakazawa, R. Endo, S. Nagaoka, H. Saito, and S. Umemura

AIR POLLUTION AND NASAL AND PARANASAL CAVITIES ON THE EFFECTS OF OZONE-EXPOSURE ON NASAL AND PARANASAL CAVITIES OF RABBITS, AND THEIR PATHOHISTOLOGICAL STUDY. *(Taikiosen to bifukubiko, ozone-bakuro no kato bifukubiko no oyobosu eikyo ni tsuite, sono byorisoshikigakuteki kenkyu). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept. Tokyo Met. Res. Inst. Environ. Prot.), vol 6:278-284, 1975.*

Both sexes of non-SPF Dutch rabbits were exposed to ozone at 5 ppm for 3 hr and were killed by blood-letting after and 24 hr, 3, 7 and 14 days exposure. The mucosae were removed and divided into 2 groups, for examination by scanning electon microscope and for trasmittant electron microscopic examination, then fixed and stained. Large amounts of pus in thee nasal cavity, conspicuous changes such as the loss of cilia and ablation of the epithelium in the mucosa, slight cellular infiltration beneath the epithelium, and dilatation and hyperamia of the blood vessels were found. Although these changes were found on the nasal septum and concha nasalis, no conspicuous alteration was found on olfactory parts and/or the maxillary sinus. Although there was some inflammation of the nasal cavities prior to exposure the magnitude and nature of the post-exposure indicated that the changes were due to ozone.

55310 **APTIC NO. 77240**

Ishikawa, S., K. Shimizu, M. Harada,M. Miyata, H. Ozawa, and N. Usui

AN OPHTHALMOLOGICAL SURVEY. *(Ganku bumon). Text in Japanese. In: Report of A Survey by the Tokyo B-Group on the Health Effects of Air Pollution by Photochemical Smog: p. 47-86, March 1975.*

Ophthalmological examinations were done on 82 schoolchildren, including 38 female pupils in the first and second year classes of a primary school in Setagaya Ward, Tokyo, on May 21-22, July 8-9, and October 7-8. The pH of their tears decreased when there was photochemical smog. The average lysozyme activity did not differ in the presence on absence of smog. However, its two-peak type of distribution translocated left and right, respectively, when there was photochemical smog. A slightly increased fluctuation of the center of gravity was observed during photochemical smog. In human exposure experiments to acrolein as a model of photochemical smog, the pH of tears generally decreased after 1 hr of exposure, with a slow recovery after 24 hr. The activity of lysozomes fluctuated just after the exposure and showed a general increase. When rabbits were exposed acrolein at 10 ppm for 1 hr, spot-like superficial keralitis occurred in the limited area of the pupil with morphological lesions on more than 2 layers of the corneal epithelial cells.

55311 **APTIC NO. 78997**

Jaksch, John A.

SOME ECONOMIC DAMAGES TO HUMAN HEALTH RESULTING FROM THE CATALYTIC CONVERTER. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 23p., 1975. 18 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-11.5.)*

The economic consequences of adverse human health effects resulting from the use of catalytic converters for automobile emission control are estimated for the second, fourth, and tenth model years. Sulfuric acid mists from converters can potentially aggravate the disease condition of persons suffering from cardiovascular-respiratory problems. Health data are presented as days with symptoms worsened, number of illnesses, number of individuals affected, and so forth per disease category. The health data are then converted into number of physician visits, number of hospital admissions, drug consumption, and restricted activity days for each of the three model years. An estimated net national health damage cost of 20 million dollars/yr is arrived at for the second model year, and the damages are expected to rise to approximately $480 million/yr by the tenth model year.

55312 **APTIC NO. 79177**

Kelsey, Andrea, Gene R. Lowrimore, and Jane Smith

THE CONVERSION OF CHESS AND OTHER SYSTEMS. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 282-288, Jan. 1975. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)*

NTIS: PB 241 150

A computer program, known as CHESS, designed for epidemiological studies of the effects of elevated levels of air pollutants on human health is discussed, with particular emphasis on its conversion from an IBM 360 system to a Univac 1110 system. The computer program provides the bulk of information upon which current ambient air quality standards are based and includes such indicators of human health as acute and chronic respiratory disease, pulmonary function, acute episodes, asthma occurrence, aggravation of chronic symptoms, and lower respiratory disease. Topics covered include: the CHESS data processing system design, system implementation, advantages and disadvantages associated with the conversion of the program from an IBM 360 to a Univac 1110 system, and recommendations for similar conversions.

55313 **APTIC NO. 77143**

Kobayashi, K.

ENVIRONMENTAL SANITATION AND ITS DEVELOPMENT IN YOKKAICHI. *(Kankyo eisei, Yokkaichi no ayumi o furikaette). Text in Japanese. Koshu Eisei (Public Health), 39(8):504-506, Aug. 1975.*

The activities of local health centers and the development of the Yokkaichi Health Center are described. The central problem in Yokkaichi was mainly that of water and air pollution and odors resulting from a petroleum complex. The development of environmental pollution began in 1953 when inhabitants complained of odors from sulfated pitch and sulfur dioxide. In 1960, complaints of so-called Yokkaichi-asthma appeared. In 1965, an independent municipal system of recognizing patients suffering from respiratory diseases due to air pollution was established. Due to preventive measures, the degree of air pollution decreased. However, owing to meteorologicall factors, the degree of air pollution is fluctuating.

55314 **APTIC NO. 77241**

Kobayashi, T.

AN OTORHINOLOGICAL SURVEY. *(Jibika). Text in Japanese. In: Report of A Survey by the Tokyo B-Group on the Health Effects of Air Pollution by Photochemical Smog: p. 87-95, March 1975.*

Otorhinological examinations were done 3 times on 42 first-year pupils and on 42 second-year pupils on May 21, July 8 October 8, May 22 July 9 and October 7, in a primary school in Setagaya Ward, Tokyo Metropolis. No conspicuous findings were obtained on the pharynogolarynx. In the case of second-year pupils on July 9, an increase of luminosity and a decrease of saturation of the nasal mucosa were observed. However, these symptoms did not differ significantly from those in first-year pupils. No characteristic change was observed in their olfaction or sense of taste.

55315 **APTIC NO. 76945**

Kopito, L. E. and H. Shwachman

LEAD IN HUMAN SCALP HAIR: SOME FACTORS AFFECTING ITS VARIABILITY. *J. Invest. Dermatol., 64(5):342-348, May 1975. 26 refs.*

The accumulation of lead in human scalp hair was composed in male and female children and adults from various locations in the United States, Japan, Yugoslavia, Iran, and South Africa. Hair specimens were cut into measured lengths and cleaned to remove surface contaminants. They were then dissolved in nitric and perchloric acids, and the solution was analyzed for lead by atomic absorption spectrophotometry. The most significant variables which influenced the concentration of lead in hair were ingestion of lead-containing substances, exposure to lead of environmental origin, place of residence, site from which the hair specimen was sampled relative to its distance from the scalp, and age. The least significant variables were sex and some nutritional deficiencies. (Author abstract modified)

55316 **APTIC NO. 79359**

Koshi, Kimiko, Katsunori Homma, and Hiroyuki Sakabe

RESPONSES OF ALVEOLAR MACROPHAGE TO METALLIC FUME. *Ind. Health (Japan), 13(1-2):37-49, June 1975. 15 refs.*

Alveolar macrophage was lavaged from lungs of rats exposed to inhalation of the particles of antimony, lead, cadmium, calcium carbonate, or polyvinyl chloride (PVC) and its number and 14 carbon-leucine incorporating activity were studied. The number of free cell lavaged from the lung decreases by exposure to Sb or Cd fume, but not by exposure to Pb fume, CaCO3, or PVC particles. A linear correlation exists 1 hr after inhalation between 14C-leucine incorporation value for total cells and the number of lavaged cells in all the experimental groups except an untreated control group and Sb group. In these groups the incorporation value per cell is lower than those of the other groups. The effects of the particles used in the inhalation experiment on the macrophages in vitro were studied. The Sb fume is the most effective of all the samples followed by Cd fume and Pb fume. The particles of CaCO3 or PVC are practically inert to the macrophage. (Author abstract modified)

55317 **APTIC NO. 77224**

Kumakura, N.

THE SOCIAL ROLE OF PSYCHOGENIC THEORY IN THE SO-CALLED PHOTOCHEMICAL SMOG DAMAGE INCIDENTS. *(Iwayuru kokagaku smog higai no oite shin-in ron no owasareta shakaiteki yakuwari).*

Text in Japanese. Sieshin shinkeigaku Zasshi (Psychiat. Neurol., Japan), 77(6):475-488, 1975. 21 refs.

In the case of human damage due to so-called photochemical smog which occurred in Tokyo in 1972, the social role of psychogenic theory was discussed. Physicians who were involved in the photochemical smog incidents did not feel that the patients general symptoms were due to air pollution. The symptoms were attributed to nervousness or nervous anxiety. A group of physicians in administration published an article stating that symptoms were psychogenic. Following criticism, the patients developed physical and mental symptoms. However, the symptoms had social sanctions to justify the administration of environmental pollution and the administrative system of the school where the damage occurred. The psychogenic theory became the logic which justified the creation of false illnesses by patients.

55318 **APTIC NO. 79068**

Lave, Lester B.

SHORT TERM HEALTH CONSIDERATIONS REGARDING THE CHOICE OF COAL AS A FUEL. *In: Mineral Resources and the Environment. Appendix to Section III. Report of Panel on the Implications of Mineral Production for Health and the Environment. National Academy of Sciences, Washington, D. C., Committee on Mineral Resources and the Environment, Department of the Interior and National Science Foundation Contract S0122128, D73.123C, C310-285-000, p. B.1-B.14, Feb. 1975.*

NTIS: PB 239582

Estimates of the short term occupational and public health costs associated with electrical generation via coal burning are presented. The public health risk associated with sulfur dioxide and particulate effluents from coal-burning plants is estimated to be about 18,000 times greater than that associated with the radionuclide effects from a light-water reactor. During the extraction phase, coal mining results in roughly 10 times the number of occupational disability days per megawatt hour as does uranium extraction or oil extraction. The operation of a coal-fired electrical generation plant located near a major metropolitan area produces public health effects whose cost is of the same order of magnitude as the cost of producing the electricity itself.

55319 **APTIC NO. 79566**

Lavergne, B., L. Frappier-Davignon, and J. St. Pierre

STUDY OF THE EFFECT OF AIR POLLUTION ON LUNG CANCER AND INTESTINAL CANCER MORTALITY ON MONTREAL ISLAND BETWEEN 1963 AND 1966. *(Etude de l-efft de la pollution atmospherique sur la mortalite par cancer du poumon et par cancer de l intestin ile de Montreal 1963-1966). Text in French. Union Med. Canada, 104(9):1397-1406, Sept. 1975.*

The relationship of mortality from lung cancer and cancer of the intestine to the effect of prolonged exposure to various degrees of air pollution was investigated on the island of Montreal from 1963-1966. There is an association between a very high level of air pollution and an excess of mortality from lung cancer and cancer in the intestine in men as well as in women. Factors such as smoking habits, occupation, and low socioeconomic status are not related to this excess of mortality.

55320 **APTIC NO. 77257**

Lawther, P. J and R. E. Waller

PHYSICAL HAZARDS. *Postgrad. Med. J. (London), 51(Suppl. 2):5-9, 1975. 11 refs.*

A study was made of approximately 800 children exposed to an exceptionally high level of pollution in infancy: those born in London just before the fog of December 1952. Three small areas of London were selected, and within these all the residents reaching age 18 in 1970 were contacted. A further sample was taken in the same areas of those born in 1953, so that the second group differed only in having missed the 1952 fog. A modified form of the MRC Questionnaire on Respiratory Symptoms (1966) was used in this study and measurements of forced expiratory volume in 1 second, forced vital capacity, and peak expiratory flow were made. Questions on respiratory symptoms, previous illnesses, smoking habits, and environmental conditions were asked. There were no differences in the results between subjects born before the fog and those born after it. Smoking was associated with a substantial increase in the prevalence of respiratory symptoms, and a slight reduction in some of the ventilatory capacity measurements. The main factor associated with reduced ventilatory capacity was a history of respiratory illness in childhood. None of the other environmental factors considered had any substantial and consistent effect on the prevalence of respiratory symptoms, nor on ventilatory capacity. Results are compared to those of previous studies, in which young children and the elderly were found most susceptible to death during episodes of air pollution, and respiratory illnesses in children were linked to air pollution levels over a period of several years.

55321 **APTIC NO. 79520**

Lawther, P. J.

CARBON MONOXIDE. *Brit. Med. Bull., 31(3):256-260, Sept. 1975. 30 refs.*

The sources, distribution, and health hazards of carbon monoxide in the atmosphere are reviewed. Man produces 250 million tons of CO annually. The most important source of CO is the gasoline (spark ignition) engine. As much as 13% of the exhaust may be CO. The concentration of CO in street air falls sharply with distance from the source. Dispersion of the gas is produced by wind and by the turbulence caused by the movement of vehicles. Rush hour concentrations of 20-30 ppm are common and peak concentrations of over 300 ppm have been recorded. It is unusual to find carboxyhemoglobin (COHb) saturations in excess of 3% in non-smokers exposed to street air. The formation of COHb blocks oxygen carriage by inactivating hemoglobin, and its presence in the blood shifts the dissociation curve of HbO2 to the left. The only notable chronic manifestations of prolonged exposure to relatively low concentrations of CO are acclimatization and the damage to the blood vessels in relation to smoking. Most of the physiological effects of CO are related primarily to hypoxia. High concentrations of CO can impair central nervous system functions, but there is little evidence that COHb saturations of less than 3% can impair perception or performance. The multifarious cardiovascular effects of CO are reviewed. It is easier to set industrial standards than ambient air quality standards for CO. It may be feasible to set standards lower than the 4% COHb recommended by the World Health Organization.

55322 **APTIC NO. 79503**

Lebowitz, Michael D. and Benjamin Burrows

TUCSON EPIDEMIOLOGIC STUDY OF OBSTRUCTIVE LUNG DISEASES. II: EFFECTS OF IN-MIGRATION FACTORS OF THE PREVALENCE OF OBSTRUCTIVE LUNG DISEASES. *Am. J. Epidemiol., 102(2):153-163, 1975. 13 refs.*

The effects of in-migration factors on respiratory symptoms, chronic health problems, and lung function of residents in Tucson, Arizona were examined as part of a longitudinal epidemiological study of obstructive lung disease. Migration to the area specifically for health reasons explained part of the high prevalence of various diseases, but natives still showed higher rates of disease than those generally found in other parts of the United States, especially with regard to asthma and allergic rhinitis. Previous urban residence was related to the prevalence of several diseases, even when controlling for age, sex, and smoking habits. However, the trends were not always clear, and the differences were not great enough to explain the Tucson population s much higher rates of these diseases. (Author abstract modified)

55323 **APTIC NO. 75899**

Lukens, Herbert R., Colin B. Williams, Stuart A. Levison, Walter B. Daadliker, and Dennis Muryama

A FLUORESCENCE IMMUNOASSAY TECHNIQUE FOR DETECTING ORGANIC ENVIRONMENTAL CONTAMINANTS (FINAL REPORT). *IRT Corp., San Diego, Calif. and Scripps Clinic and Research Foundation, La Jolla, Calif., Biophysical-Chemistry Unit, Environmental Protection Agency Contract 68-02-1266, Program Element 1E1078, ROAP 21AFM, Rept. EPA-650/1-75-004, INTEL-RT 8098-004, 70p., May 1975. 17 refs.*

NTIS: PB 243397/AS

A fluorescence polarization immunoassay technique was successfully demonstrated to be highly sensitive and specific for the detection of 2-aminobenzimidazole, a metabolite of certain fungicide agents used in agriculture. The particular fluorescent moiety chosen to form the conjugate with 2-aminobenzimidazole was fluorescein. The detection sensitivity of the method was in the sub-nanogram/ml range. A successful quantitative recovery from an unknown solution was also obtained. The technique appears capable of detecting low molecular weight organic contaminants of environmental concern. (Author abstract modified)

55324 **APTIC NO. 77238**

Makino, K. and I. Mizoguchi

ON THE SURVEY OF SUBJECTIVE SYMPTOMS DUE TO PHOTOCHEMICAL SMOG. *(Kokagaku smog ni yoru jikakushojo chosa ni tsuite). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 22(8):421-430, Aug. 1975. 20 refs.*

Of 850 pupils in kindergartens, primary schools, middle schools, and high schools located in the northern part of the Meguro Ward, Tokyo, the complaints of subjective symptoms due to photochemical smog were collected from July 1972 to June 1973 by making them or their parents fill out questionnaires. Air pollution factors included oxidant, nitrogen dioxide, nitric oxide, floating dust, and the highest temperature and humidity per day. In summer, complaints of eye irritation predominated and per annum complaints of cough predominated. The former appears to be due to photochemical smog, and the latter to the common cold. By age, the pollutants and meteorological factors which bore a close relationship to the subjective symptoms were oxidant, followed by temperature. Eye irritation, tearing, pain in the throat, dyspnea, headache were though to be due to photochemical smog. The pollution index devised by the authors, showed a significant correlation to symptoms attributable to photochemical smog and its threshold value would be 4.

55325 **APTIC NO. 79305**

Matsuoka, Masao

AIR POLLUTION IN SETAGAYA WARD AND HEALTH OF STUDENT PROTECTORS. *(Setagaya-ku no taiki osen to gakudo yogoin no kenko). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo, p. 286-287, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

Health examinations were given to student protectors in Setagaya Ward, Tokyo, Japan, in March 1973. Of 112 persons, only one person had no health problems. Since these persons must pass a physical examination, and be certified to be in good health at time of hiring, working conditions were suspected as the cause of health deterioration. They must remain outdoors in cold and heat, and are exposed to automobile exhaust gases. Therefore, nitrogen dioxide concentrations were determined at various locations during the hours that these protectors were on duty. Plastic tubes with lids, containing filter paper impregnated with triethanolamine, were exposed to the atmosphere, and NO2 concentrations were determined by colorimetry. In June 1974, during a 6-day period, NO2 concentrations ranged from 0.070 to 0.490 ppm at a total of 131 monitoring locations; the average of all measurements was 0.199 ppm. When 135 protectors (all female; 40% in their 50 s; 24.6% in their 60 s) were queried about health, 39.6% had seen doctors; 44.4% complained about headaches; 30.6% caught cold easily; and 23.9% complained of feelings of irritation. Suggestions for improving working conditions include use of activated charcoal masks, cold weather uniforms, and use of buzzers rather than whistles (to avoid sharp inhalation of air).

55326 **APTIC NO. 77068**

McCann, Joyce, Vincent Simmon, David Streitwieser, and Bruce N. Ames

MUTAGENICITY OF CHLOROACETALDEHYDE, A POSSIBLE METABOLIC PRODUCT OF 1,2-DICHLOROETHANE (ETHYLENE DICHLORIDE), CHLOROETHANOL (ETHYLENE CHLOROHYDRIN), VINYL CHLORIDE, AND CYCLOPHOSPHAMIDE (ENVIRONMENTAL CARCINOGENS/ALKYL HALIDES). *Proc. Natl. Acad. Sci. U. S., 72(8):1-4, Aug. 1975. 60 refs.*

The mutagenicity of chloroacetaldehyde, a possible metabolite of the large volume industrial chemicals ethylene dichloride (3.5 billion kg/yr) and vinyl chloride (2.5 billion kg/yr) and of the antineoplastic agent cyclophosphamide, was investigated using a new Salmonella bacterial tester strain (TA100). Chloroacetaldehyde was hundreds of times more effective in reversion of TA100 than was chloroethanol, a known metabolic precursor of chloroacetaldehyde and a possible metabolite of ethylene dichloride and vinyl chloride which is itself mutagenic for TA100. Chloroethanol was activated by rat liver homogenates to a more highly mutagenic form and showed reversion properties similar to chloroacetaldehyde. The reversion properties of cyclophosphamide after in vitro metabolic activation suggested that chloroacetaldehyde is not the active mutagenic form of this antineoplastic drug. (Author abstract modified)

55327 **APTIC NO. 77243**

Mikami, R., S. Kudo, K. Sasaki, and H. Yotsumoto

REPORT ON THE MEDICAL EXAMINATION OF PHOTOCHEMICAL SMOG PATIENTS. *(Kokagaku smog kenshin hokokusho, naika bumon). Text in Japanese. In: Report of A Survey by the Tokyo B-Group on the Health Effects of Air Pollution by Photochemical Smog: p. 29-38, March 1975.*

The results of internal examinations on 82 children (boys and girls) in the first and second year classes of a primary school in Setagaya Ward, Tokyo, are discussed. According to the results from May, July, and October, some findings were obtained on the heart and lungs, and swelling of the liver, and abnormal blood pressure were observed. However, these changes were not related to air pollution. The lower blood pressure seen in July was a seasonal variation. Respiratory resistance decreased with time. This was attributable to the increase in body height and the experience of the examination. The findings of the examination showed no clear effect of photochemical smog. Questionnaires showed that 15.6% of the boys and 28.9% of the girls had orthostatic coordination disturbances. There was no relationship between allergic disease history and autonomic nervous symptoms.

55328 **APTIC NO. 77244**

Mizoguchi, I.

RELATIONSHIP BETWEEN AIR POLLUTION AND COMPLAINTS OF SUBJECTIVE SYMPTOMS. *(Kenko nisshi yori mita taikiosen to jikakushojo sosho to no kanren). Text in Japanese. In: Report of A Survey by the Tokyo B-Group on the Health Effects of Air Pollution by Photochemical Smog: p. 5-28, March 1975.*

During 61 days starting on May 20, subjective symptoms recorded by 515 pupils of a middle school in Setagaya Ward, Tokyo, and the air pollution data on the school were examined. The frequency of photochemical smog of more than 0.15 ppm oxidant cencentration was only 5, with the maximum concentration of 0.23 ppm. There were only 3 days when the temperature was over 30 C and 19 rainy days during the survey period. The pupils health diaries indicated that the most conspicuous symptoms were ocular, followed by pain in the throat and dyspnea. The complaints of cough was attributable to photochemical smog.

55329 **APTIC NO. 77144**

Moriyama, Y.

ENVIRONMENTAL POLLUTION AND THE HEALTH OF MOTHERS AND BABIES. *(Kogai to boshi-hoken). Text in Japanese. Koshu Eisei (Public Health), 39(8):507-511, 1975.*

The problem of air pollution by sulfur dioxide emitted from a Yokkaichi petroleum complex and its effects on the health of mothers and their babies living in polluted areas is analyzed. Air pollution due to primary industrial pollutants such as smoke, carbon dioxide, sulfur oxides, sulfur compounds, carbon monoxide, and dusts containing heavy metals, and carbon monoxide, hydrocarbons, and lead compounds in auto exhausts, and secondary pollutants such as ozone, oxidants and aldehydes is described in connection with damage of the fetus. Types of damage include oxygen deficiency, and physical malformations, cerebral palsy, infectious respiratory diseases of pregnant women, severe jaundice of newborns, and anemia in pregnant women due to sulfur dioxide.

55330 **APTIC NO. 76963**

Neumann, C.

THE EPIDEMIOLOGY OF LUNG CANCER IN THE GERMAN FEDERAL REPUBLIC, WITH SPECIAL REFERENCE TO REGIONAL DIFFERENCES. *(Zur Epidemiologie des Lungenkrebses in der Bundesrepublik Deutschland unter besonderer Beruecksichtigung regionaler Unterschiede). Text in German. Praxis Pneumol., 29(1):32-42, 1975. 5 refs.*

Lung cancer mortality statistics for various parts of the German Federal Republic were examined. About 11% more men and 23% more women died of lung cancer between 1960 and 1971 than would be the case if the age structure had remained unchanged. The increased mortality rate involved the over-65 age group predominantly. An upward trend in men which was most prenounced in the 45-74-year age group was also observed. The lung cancer mortality rate was highest in highly industrialized urban areas and lowest in less industrialized regions, particularly South Germany. Particularly marked increases in lung cancer deaths were observed among men in heavily industrialized areas, suggesting that occupational exposure might be the possible cause of such increases.

55331 **APTIC NO. 77183**

Nourse, L. D., P. N. Nourse, Helen Botes, and H. M. Schwartz

THE EFFECTS OF MACROPHAGES ISOLATED FROM THE LUNGS OF GUINEA PIGS DUSTED WITH SILICA ON COLLAGEN BIOSYNTHESIS BY GUINEA PIG FIBROBLASTS IN CELL CULTURE. *Environ. Res., 9(2):115-127, April 1975. 16 refs.*

The effects of macrophages isolated from the lungs of guinea pigs dusted with silica on collagen biosynthesis by guinea pig fibroblasts in a cell culture were investigated to clarify the biochemical and cellular mechanisms of silicosis. Collagen synthesis was measured by the formation of radiocarbon-labeled hydroxyproline in the cell layer and medium proteins of guinea pig embryo lung fibroblasts in cell culture. Neither the extract nor the residual fraction of a million normal or silica-treated macrophages exerted any effect on collagen biosynthesis by fully confluent fibroblast cultures grown in fetal bovine serum. Fractions from 5 million or more macrophage cells inhibited collagen synthesis. A 60% stimulation of hydroxyproline formation without a concomitant increase in peptide synthesis was observed when freshly plated or nonconfluent fibroblasts were used with the supernatant from a million silica-treated macrophages. Conflicting findings on the stimulation of collagen synthesis by extracts of silica-treated macrophages previously observed by other investigators appeared to be due to differences in the growth state of the fibroblast cultures. (Author abstract modified)

55332 **APTIC NO. 77157**

Parkes, Douglas G. and Thomas E. Eling

THE INFLUENCE OF ENVIRONMENTAL AGENTS ON PROSTAGLANDIN BIOSYNTHESIS AND METABOLISM IN THE LUNG. INHIBITION OF LUNG 15-HYDROXYPROSTAGLANDIN DEHYDROGENASE BY EXPOSURE OF GUINEA PIGS TO 100 PER CENT OXYGEN AT ATMOSPHERIC PRESSURE. *Biochem. J., 146(3):549-566, 1975. 33 refs.*

The effect of exposing guinea pigs to sulfur dioxide and oxygen on the rate of prostaglandin biosynthesis and catabolism by lung fractions in vitro was studied. Exposure of guinea pigs to 500 ppm of SO2 for 5 hr or to 50 ppm for 90 days (6 hr/day) did not alter the production or degradation of prostaglandins by lung fractions in vitro. Exposure of the animals to 100% O2 for 48 hr inhibited the rate of prostaglandin metabolism in vitro by 60-70% without significantly altering the rate of biosynthesis by lung fractions. Inhibition of prostaglandin dehydrogenase activity in vitro by lung fractions after exposure of the animal to O2 was dependent on the duration of exposure. Gluthathione S-aryltransferase and catechol O-methyltransferase activities of guinea pig lung supernatant (100,000 gravity units) were unaltered by exposure of the animal to O2. Inhibition of pulmonary prostaglandin dehydrogenase after exposure of the animal to O2 did not appear to be the result of a general toxic response. (Author abstract modified)

55333 **APTIC NO. 79200**

Phalen, R. F., H. C. Yeh, O. G. Raabe, and D. J. Velasquez

SELECTED REFERENCES ON LUNG AIRWAY STRUCTURE AND THE DEPOSITION OF INHALED PARTICLES (A BIBLIOGRAPHY). *Lovelace Foundation for Medical Education and Research, Albuquerque, N. Mex., Inhalation Toxicology Research Inst., Atomic Energy Commission Contract AT(29-2)-1013, 113p., Jan. 1975. 743 refs.*

NTIS: LF-48

A bibliography of over 700 references related to the structure and function of the respiratory airways is presented. The emphasis of the referenced material is on morphometric techniques, comparative mammalian airway anatomy, and various subjects related to the deposition sites of inhaled particles. The citations are alphabetized by author and are further categorized by the use of 10 nonexclusive subject areas. The bibliography, which is stored on magnetic cards, is intended to be a working document for researchers and is scheduled for periodic revision. The current version includes documents appearing before May 1974. (Author abstract modified)

55334 **APTIC NO. 79562**

Rejthar, L. and A. Rejthar

HISTOLOGICAL CHANGES OF TERMINAL BRONCHIOLES IN RATS DURING THE EXPOSURE TO NITROGEN DIOXIDE. *Exp. Pathol., 10(5/6): 245-250, 1975. 12 refs.*

Histological changes of terminal bronchioles in rats during long term exposure to 5 ppm nitrogen dioxide are described. Initial changes include the loss of cilia and cell differentiation. These changes are followed by epithelial hyperplasia, leading to conspicuous narrowing of the lumen of bronchioles. After the phase of hyperplasia a phase of reparation follows, leading to the development of nonciliated epithelium without determinable Clara cells, with areas of uniform multi-layered epithelium. (Author summary modified)

55335 **APTIC NO. 77022**

Roels, H. A., R. R. Lauwerys, J. P. Buchet, and M. T. Vrelust

RESPONSE OF FREE ERYTHROCYTESPORPHYRIN AND URINARY DELTA- AMINOLEVULINIC ACID IN MEN AND WOMEN EXPOSED TO MODERATE AMOUNTS OF LEAD. *Int. Arch. Arbeitsmed., 34(2):97-108, 1975. 19 refs.*

The identical range of blood lead levels in both groups indicated a similar degree of exposure to inorganic lead. Women, however, exhibited a larger increase in free erythrocyte porphyrin (FEP) and in urinary delta-aminolevulinic acid (ALA-U) than men. The earlier response iin women was not due to a relative degree of anemia (menstrual blood loss), since there was no correlation between hemoglobin and FEP or ALA-U. There was a greater susceptibility to lead of the heme biosynthetic pathway in women. A preliminary, limited survey of children 11-12 years old in schools located less than 1 km from a lead-processing plant revealed increased FEP and blood lead concentrations and demonstrated that children, like women, exhibit an earlier biological response to lead than adult men.

55336 **APTIC NO. 77227**

Saito, K., H. Honma, N. Taniguchi, T. Tomita, and H. Takakuwa

EFFECTS OF ODOR ON HUMAN BODIES, A NEW DEVELOPMENT OF HUMAN OLFACTOMETER, AND CHANGES OF PHYSIOLOGICAL FUNCTION DUE TO ODOR EXPOSURE. *(Nioi busshitsu no seitai ni oyobosu eikyo ni tsuite, jintaiyo shukakukei no shisaku narabini nioi-bakuro ni yoru seiriteki hendo). Text in Japanese. Nihon Eiseigaku Zasshi (Japan. J. Hyg.), 30(2):289-295, June 1975. 11 refs.*

A human olfactometer (an exposing chamber to expose a person to 12.7 l/min of air polluted by odor) is described. Human threshold values of olfaction were determined for beta-phenylethyl alcohol, Cyclotene, isovaleric acid, gamma-undecalactone, skatol, exaltolide, phenol, dl-camphor, diallyl sulfide, and mineral acid. After exposing human subjects to isovaleric acid at a quarter of the threhold value for 30 min, the alpha-wave of the EEG showed no significant alteration. However, its appearance was more frequent in air with odor than in air without odor. The heartbeat showed no significant change, and the minimum blood pressure was raised. By exposing human subjects for 15 min to ammonia at 4 ppm or hydrogen sulfide at 0.12 ppm, relatively large individual differences were observed on TAF-L. However, in the case of ammonia, six persons out of seven complained of headache, and in the case of hydrogen sulfide seven out of eight persons complained of headache malaise, and nausea.

55337 **APTIC NO. 77145**

Satake, T.

AIR POLLUTION AND IMPAIRMENT OF THE RESPIRATORY SYSTEM; RECENT DEVELOPMENT OF A DETECTION METHOD FOR IMPAIRMENT AND THE AUTHOR S RECOMMENDATION FOR ITS APPLICATION. *(Taiki-osen to kokyuki shogai, saikin ni okeru kenshutsuho no shinpo to oyo e no susume). Text in Japanese. Kokyu to Junkan (Respir. Cir.), 23(9):763, 1975.*

The deficiencies of conventional methods of detection of health impairment due to air pollution, including morbidity, examination of pulmonary function, and mortality (especially of infants), the relationship between air pollutants and respiratory impairment are discussed. The following methods of detection are proposed; flow-volume curve, closing volume for field survey, and gases in blood such as oxygen and carbon dioxide, pH, and A-aD for acute symptoms due to photochemical smog.

55338 **APTIC NO. 79473**

Shellshear, I. D., L. D. Jordan, D. J. Hogan, and F. T. Shannon

ENVIRONMENTAL LEAD EXPOSURE IN CHRISTCHURCH CHILDREN: SOIL LEAD A POTENTIAL HAZARD. *New Zealand Med. J., 81(538):382- 386, April 23, 1975.*

A study of childhood blood lead levels and of soil lead levels has been carried out in Christchurch. Blood samples were taken from a random selection of pediatric hospital admissions, aged 1 to 5 yr inclusive. Samples of soil from the greater Christchurch area were taken by dividing the area up into grids and taking random samples from within each grid. Both red cell and soil leads were measured by atomic absorption spectrophotometry. The results indicate a potent hazard especially to the child with unusual appetite for soil. Screening and preventive programs are briefly discussed. (Author abstract modified)

55339 **APTIC NO. 79426**

Singh, Narayani P., John D. Bogden, and Morris M. Joselow

DISTRIBUTION OF THALLIUM AND LEAD IN CHILDREN S BLOOD. *Arch. Environ. Health, 30(11):557-558, Nov. 1975. 13 refs.*

Mean whole blood concentrations for lead and thallium were determined by atomic absorption spectrophotometric analysis for children residing in Newark, N. J. Frequency distributions for the various concentration ranges for both metals are recorded. The thallium content in most (96.9%) of the subjects is between 0.5 micrograms/100 ml and 2.0 micrograms/ 100 ml. A small percentage (1.6%) of the subjects have levels between 2.1 micrograms/100 ml and 4.0 micrograms/100 ml. The remainder of the population (1.6%) have levels greater than 2.0 micrograms/100 ml. the observed range of Pb found in the blood is between 4 micrograms/100 ml and 86 micrograms/ 100 ml. A total of 63.5% of the children have Pb values lower than 40 micrograms/100 ml. A total of 33.2% have blood Pb concentrations between 40 micrograms/100 ml and 59 micrograms/100 ml, whereas 3.4% of the population has Pb poisoning. There is no noticeable correlation between the Pb and Th content of whole blood. Exposure to and/or absorption of these substances are different. (Author abstract modified)

55340 **APTIC NO. 79449**

Sorensen, Bent

COMPUTER SIMULATION OF I-131 TRANSFER FROM FALLOUT TO MAN. *Water, Air, Soil Pollut., 4(1):65-87, March 1975. 35 refs.*

A computerized simulation of iodine-131 transfer from radioactive fallout to man is presented. Thyroid accumulation and excretion are modelled for both cow and man, with intake routes such as grass and stored fodder, soil and drinking water sources, milk, and air inhalation sources being considered. A simulation of major fallout during the fall of 1962 following tests of nuclear weapons indicates that the human thyroid level is governed by milk intake and inhalation. Thus, the forage-to-cow-to-milk pathway of radioactive iodine contamination is not the only one of importance to man.

55341 **APTIC NO. 79501**

Spyker, Joan M.

ASSESSING THE IMPACT OF LOW LEVEL CHEMICALS ON DEVELOPMENT: BEHAVIORAL AND LATENT EFFECTS. *Fed. Proc., 34(9):1835-1844, Aug. 1975. 38 refs.*

Behavioral and latent effects resulting from low level exposure to toxic chemicals during periods of development (conception to puberty) in animal organisms are discussed. A longitudinal study of mice exposed to methylmercury, either indirectly via the pregnant mother or directly shortly after birth, revealed that the mice, although apparently normal at birth, responded differently from controls when tested for maturational and behavioral deviations at various stages throughout postnatal development. These early behavioral indicators were forewarnings of later, more severe developments such as obvious motor impairment, neuropathology, postural problems, immuno-deficiencies, generalized debilitation, and early aging. The severity of the deficit and the length of time before it was detected was generally dose- dependent. Behavioral and long-term evaluations of organisms exposed during development to toxic substances are concluded as essential for a thorough assessment of the impact of certain low level chemicals on human health.

55342 **APTIC NO. 77088**

Swift, David L.

STUDY OF THE FLOW RATE EFFECT IN UPPER RESPIRATORY DEPOSITION AND IMPLICATIONS FOR EXERCISE EXPOSURE. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 11p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-50.4.)*

The effect of breathing rate and mode (oral or nasal) on the deposition of monodisperse aerosols (1.2 micron) in the human respiratory tract was investigated. An increase in the rate of oral breathing led to decreased respiratory tract deposition, consistent with the assumption that deposition occurs in the small airways and is governed by sedimentation. Conversely, during nasal breathing, an increase in the breathing rate led to an increased overall deposition fraction, consistent with impactive removal in the nasal passage. The deposition of the particles in the tracheo-bronchial and alveolar regions during either breathing mode was significantly less than that predicted by quantitative deposition estimates for respirable aerosols. Under strenuous exercise when nasal breathing changes to oral breathing, there was only a modest increase in tracheo-bronchial and alveolar deposition (from 10-15%) because of the decreased residence time of the aerosol in the respiratory tract. (Author abstract modified)

55343 **APTIC NO. 77239**

Takenaka, K.

POLLUTION-RELATED HEALTH DAMAGE AND THE COMPENSATION SYSTEM. *(Kogai kenkohigai to sono Kyusai). Text in Japanese. Kogai to Taisaku (J. Pollution Control), 11(8):2-8, Aug. 1975.*

Instances of pollution-related health impairment in Japan are discussed, including those of respiratory disturbance due to air pollution. The relationship between environmental pollution and health damage is analyzed, including the dynamic balance between health and disease, the dose-response relationship, specific and non-specific diseases, and epidemiological investigations. The criterion of pollution-related health impairment is the suspicious cases are officially recognized. Once a patient is recognized to be suffering from a pollution- related disease and officially designated, he is entitled to benifits from the national compensation system. The history of the system is described. Specially designated areas include the south coastal area of Chiba, a specific area of Tokyo, Yokohama, Kawasaki, Fuji, Nagoya, and Yokkaichi City. The diseases designated as pollution-related diseases are bronchitis, bronchial asthma, asthmatic bronchitis, pulmonary emphysema, and their secondary diseases.

55344 **APTIC NO. 77237**

Tani, S.

EPIDEMIOLOGICAL STUDY OF SYMPTOMS OF CHRONIC BRONCHITIS AND AIR POLLUTION. *(Taiki-osen to manseikikanshien shojo no ekigakuteki kenkyu). Text in Japanese. Nippon Koshu Eisei Zasshi (Japan. J. Public Health), 22(8):431-438, Aug. 1975. 47 refs.*

From the inhabitants of Fuji City, which is polluted by sulfur and nitrogen oxides, carbon monoxide, and oxidants, 973 men and 1028 women older than 60 and younger than 60 were selected. They were interviewed by questionnaire regarding symptoms of respiratory diseases. The area in which they lived was divided into 7 sub-areas. In every sub-area, the correlation between standardized morbidity of chronic bronchitis and the 3-yr average concentration of sulfur oxides was high. When the sub-areas were classified into highly polluted and the not highly polluted areas, the difference in the morbidities of the two groups was attributed, in part, to the degree of air pollution as well as smoking habits, age and sex. The morbidity of inhabitants living in a circle with a diameter of 1 km around the monitoring point was highly correlated to the degree of pollution.

55345 **APTIC NO. 77226**

Tomita, K.

PROFESSIONAL FATIGUE OBSERVED FROM SUBJECTIVE SYMPTOMS, IN THE CASE OF POLICEMEN ON OUTSIDE DUTY. *(Jikaku shojo yori mita hiro, giakin keisatsukan no baai). Text in Japanese. Seikatsu Eisei (J. Urban Living Health Assoc.), 19(3):72-82, 1975. 11 refs.*

Among the 829 policemen and -women affected by auto exhausts in the Osaka Prefecture, the subjective symptoms of fatigue were investigated. The frequency of subjective symptoms was higher after duty than before, regardless of the type duty, and the higher the frequency before duty, the higher the frequency after duty. Symptom groups included: (I) headache, fatigue; (II) irritation, loss of memory, impatience, inability to concentrate; (III) head-and body aches, dyspnea, thirst, dizziness, loss of voice, trembling of hands and legs. The frequency of complaints by symptom-group decreased in the order (I), (III), and (II), before and after duty. The frequencies of all symptoms were higher average in young people. The coefficient of variation of the complaints was larger after duty than before duty in symptom-group (I), and larger before duty than after duty in symptom-group (III). A significant difference between the frequency of symptom groups (I) and (II), (I) and (III), and (II) and (III), was found after duty.

55346 **APTIC NO. 77186**

Umeda, H.

OFFICIAL RECOGNITION OF DISEASES DUE TO ENVIRONMENTAL AIR POLLUTION AND COMPENSATION FOR THE VICTIMS OF THE DISEASES. *(Taikiosen kogaibyo no nintei to hosho). Text in Japanese. Hai to Shin (Lung Heart), 22(1):71-79, 1975.*

Disease due to environmental pollution are classified into specific disease categories such as Minamata disease, which appeared recently and non-specific ones such as chronic bronchitis, bronchial asthma, and chronic pulmonary emphysema, which already existed when air pollution was less severe. The law of compensation for diseases due to environmental pollution is explained. The conditions of official recognition of such diseases and the necessary factors of exposure to air pollution are discussed. The system of compensation, the education of the public medical treatment and diagnosis and the installation of a rehabilitation and emergency center (I.R.C.U.) are reviewed.

55347 **APTIC NO. 77242**

Uono, K. and R. Hanakago

RESULTS OF NEUROLOGICAL EXAMINATION. *(Shinkei-naika kenshin seiseki). Text in Japanese. In: Report of A Survey by the Tokyo B-Group on the Health Effects of Air Pollution by Photochemical Smog: p. 39-45, March 1975. 2 refs.*

During an occurrence of photochemical smog from late July to early August 1972 in Kunitachi City, and 46 boys and 42 girls in a middle school in Setagaya Ward, Tokyo, were examined medically 3 times, on May 21-22, July 8-9 and October 7-8. Fifteen, 20, and 27 cases of neurological findings were obtained. However, the neurological and pathological findings were minimal, and were related to season. They did not have an important relationship to photochemical smog symptoms. The electroencephalograms done on some of the children were normal, and were unrelated to photochemical smog symptoms.

55348 APTIC NO. 77176

Van Der Lende, R., C. Huygen, E. J. Jansen-Koster, S. Knijpstra, R. Peset, P. H. Quanjer, B. F. Visser, E. H. E. Wolfs., and N. G. M. Orie

AN EPIDEMIOLOGICAL STUDY OF THE CORRELATION BETWEEN AIR POLLUTION AND PREVALENCE OF AIRWAY DISEASES. *(Epidemiologisch onderzoek naar het verband tussen luchtverontreiniging en het voorkomen van luchtwegaandoeningen). Text in Dutch. Ned. Tijdschr. Geneesk (Haarlem), 119(15):577-584, April 12, 1975. 10 refs.*

A series of comparative studies of the prevalence of chronic non-specific lung disease were conducted once every 3 yr (during 5 days in the autumn) in the rural area of Vlagtwedde and the heavily air polluted area of Vlaardingen. Long-term exposure to polluted air at the macro as well as the micro level gave rise to increased production of sputum. Dyspnea was also more prevalent among individuals exposed to polluted air for long periods of time. However, no correlation was found between long-term exposure to air pollution and abnormal findings from spirometric examinations.

55349 APTIC NO. 76984

Wada, O. and S. Nagaoka

POTENTIAL EFFECTS ON HUMAN BODY OF AIR POLLUTION, PART 2: STUDIES ON THE RELATIONSHIP BETWEEN CHRONIC OBSTRUCTIVE LUNG DISEASES AND AIR POLLUTION. *(Taikiosen no senzaiteki jintai- eikyo, Second report: Tokuni mansei heisokusei hai shikkan to no kanren ni kansuru kenkyu). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept., Tokyo Met. Res. Inst. Environ. Prot.), vol. 6:247-254, 1975.*

The results health examinations of the inhabitants of the highly polluted Koto Ward and those of the non-air polluted Tama area performed in July 1973 and January 1974 are discussed. The examinations included medical questionnaires, internal and roentgenographic examinations, lung function examinations, immunological tests and otorhinolargyngeal tests. The number of cases in which there were abnormal findings in the respiratory system was small in both groups. The number of inhabitants who complained of asthmatic difficulties was larger in the polluted area. There were, however, some cases of obstructed ventilation in the Koto group but not in the Tama group. Some immunological factors and clinical signs showed a significant difference between the two groups, even within the normal value range. Findings in the upper airway showed differences between 1973 and 1974. No definite tendency was confirmed, however, probably due to masking by apparent changes, such as inflammation of the upper airway.

55350 APTIC NO. 79559

Webb, M.

CADMIUM. *Brit. Med. Bull., 31(3):246-250, Sept. 1975. 41 refs. (Presented at the Meeting of the Subcommittee on the Toxicity of Metals of the Permanent Commission and International Association on Occupational Health, Tokyo, Japan, 1974.)*

The sources and hazards of cadmium in the environment are reviewed. The major sources of contamination are the smelting and refining of zinc and lead ores, the recovery of scrap metal, the combustion of coal and oil, and the disposal of sewage sludge and of waste plastics. Much of the Cd that is emitted to the atmosphere is deposited on land and in natural waters in the neighborhood of the source, from which it is taken up by living organisms and transmitted through food chains, ingestion being the main route of absorption in animals and man. The health hazards of environmental contamination are determined by the total content of the multiplicity of toxic substances absorbed by man. Organic pollutants might both potentiate the effects of Cd2+ and be potentiated by Cd2+. Other metals might act synergistically or antagonistically with Cd2+. Synergistic, teratogenic interactions between Cd2+ and lead 2+ occur in animals and may occur in man.

55351 APTIC NO. 77222

Yamashita, T., M. Matsushima, H. Miyawaki, N. Kamamoto, and T. Hayashi

THE RELATIONSHIP BETWEEN NASAL ALLERGY AND ASTHMA IN SCHOOLCHILDREN IN HIROSHIMA CITY, 1973. *(Showa 48, Hiroshimashi gakudo no hana-allergy to zensoku to no kanrensei ni tsuite). Text in Japanese. Hiroshima Igaku (J. Hiroshima Med. Assoc.), 28(4):457-462, 1975. 2 refs.*

An investigation of the effects of air pollution on upper and lower airway allergy in 120 nasal allergic children of 339 allergic children in 8 primary schools in Hiroshima City is described. The occurrence of asthma and asthma remissions in nasal allery and nasal allergy remissions was greater than that of either nasal allergy or asthma. The occurrence of asthma in nasal allergic children was a little higher in older children than in younger ones. The occurrence of asthma was a little higher in boys than in girls.

55352 APTIC NO. 79401

Zaugolnikov, S. D., M. M. Kochanov, A. O. Louit, and I. I. Stavchansky

EXPRESS METHODS FOR DETERMINATION OF TOXICITY, LIMITING PERMISSIBLE CONCENTRATIONS AND HAZARD EVALUATION OF CHEMICAL COMPOUNDS IN THE ENVIRONMENT. *(Ekspressnye metody opredeleniya tokichnosti, PDK i otsenka opasnosti khimcheskikh soedineniy vo vneshney srede). Text in Russian. Vestn. Akad. Med. Nauk SSSR, no. 3:75-83, 1975. 100 refs.*

Equations and nomograms were developed that permit a quick evaluation of the limiting permissible concentrations and the hazards of chemical compounds in industrial premises, in atmospheric air in communities, and in water basins used for communal sanitary needs. Introduction of the methods increase the objectivity of toxicologo-hygienic evaluation of chemical compounds and, in particular, that of preliminary toxicological estimations. (Author abstract)

55353 APTIC NO. 79453

Juskin, Eugenija and Arend Bouhuys

BYSSINOSIS: AIRWAY RESPONSES IN TEXTILE DUST EXPOSURE. *J. Occup. Med., 17(6):357-359, June 1975. 19 refs. (Presented at the American Occupational Medical Association, American Industrial Health Conference, Annual Meeting, 60th, San Francisco, Calif., April 13-17, 1975.)*

Textile workers and healthy non-occupationally exposed adults were exposed to hemp dust and hemp dust extracts after pretreatment with various drugs. The inhalation of the textile dust caused bronchoconstriction in all of the subjects accompanied by reduction in maximum expiratory flow volume. The airway responses to these dusts were potentiated by propranolol and inhibited by an antihistamine drug and by ascorbic acid. The administration of 20 mg of disodium cromoglycate 30 min before challenge protected a small number of subjects against the airway constrictor effect. Textile dust extracts contain a histamine-releasing agent which accounts for the airway constriction effect.

55354 **APTIC NO. 76918**

Kanagawa Prefectural Government (Japan), Environmental Pollution Control Office

ROLE OF ACROLEIN REGARDING PHOTOCHEMICAL POLLUTION OUTBREAK AND INTERACTION OF OZONE AND ETHYL NITRITE. *(Kokagaku kogai no hassei ni kanyo suru akurorein no yakuwari to ozon oyobi ashosan echiru tono sogo sayo ni tsuite). Text in Japanese. Kokagaku Kogai no genjo to taisaku (Present Situation Countermeasure Photochem. Pollut.), vol. 1975:86-87, April 1975.*

The synergistic effect of acrolein with ozone and ethyl nitrite on non-anesthetized rabbits are studied. The rabbits were exposed to a mixture of these gases, and electrocardiography, heart rate, blood pressure, respiratory movement, and eyelid movement were examined. No apparent effect was observed from the rabbits exposed to the individual gases. However, when the rabbits were exposed to acrolein with ozone of ethyl nitrite, synergistic effects were clearly observed. For an exposure of 10 ppm acrolein with 7 ppm ethyl nitrite, the heart rate, blood pressure, and respiratory movement of the rabbits decreased to 38%, 90%, and 28% of those values before exposure, respectively. The synergistic effect with ozone was similar to that with ethyl nitrite. The heart rate, blood pressure, and respiratory movement decreased to 22%, 95%, and 10% when the rabbits were exposed to a mixture of 10 ppm acrolein and 5.34% ozone.

55355 **APTIC NO. 77042**

Bunkyo Ward Office, Tokyo Metropolis

NUMBER OF NOTIFICATIONS BY PATIENTS WITH HEALTH IMPAIRMENT DUE TO PHOTOCHEMICAL SMOG IN BUNKYO WARD, 1974. *(Bunkyo-ku nai no kokagaku smog higai todoke, 1974). Text in Japanese. In: Environmental Pollution in Bunkyo Ward (Tokyo) in 1974:p. 72-73, 1975.*

In 1974, the numbers of patients who officially reported health impairment related to photochemical smog in Bunkyo Ward, Tokyo, were as follows: 6 on July 9, 1 on July 15 and August 3, 2 on August 5, 7 on August 6, 12 on September 5 and 5 on October 4. The patients were mailmen, except for 3 primary school pupils on July 9. The hours during which the oxidant concentration was over the standard of 0.06 ppm (one hr) were 22 in July, 31 in August, 1 in September and October, whereas there were 11 in April, 43 in May and 45 in June. All symptoms appeared on the roads.

55356 **APTIC NO. 77218**

Survey Group for Environmental Pollution in the Kashima Coastal Industrial Zone

WORSENING HEALTH HAZARDS. *(Akka suru kenko higai). Text in Japanese. p. 1-10, May 1975.*

Complaints from the inhabitants of the newly developed coastal industrial zone in Kashima and data collected by local offices on health impairment due to industrial pollution are presented. Health complaints consisted mainly of symptoms such as ocular hyperemia, foreign bodies in the eyes, throat pain, dyspnea, colds, and headache. Some inhabitants complained of long-term sputum. Medical examinations support their complaints. The morbidity of respiratory disease and infection (including that of infants) increased up to 4 to 5 times since 1969.

55357 **APTIC NO. 79035**

Environmental Protection Agency, Cincinnati, Ohio, National Environmental Research Center

ENVIRONMENTAL TOXICOLOGY RESEARCH LABORATORY. *Environmental Protection Agency Rept. EPA-670/9-75-002, 7p., March 1975.*

Activities of the Environmental Toxicology Research Laboratory during 1974 regarding the potential toxicity of automotive emissions originating from oxidation catalysts and possible hazards associated with catalytic attrition products are reviewed. The studies include: measurements of exhaust emissions with and without catalytic converters, an assessment of the acute biological effects of exhaust emissions (with and without catalytic converters) on laboratory animals, investigations of the effect of catalyst-treated exhaust emissions and components on the development and growth of pregnant and newborn rats, observations of the effects of exposure to catalyst-treated exhaust on pulmonary free cells, the chemical characterization and biochemical toxicity of organic and inorganic components of auto exhaust, studies of the effect of exposure to catalyst-treated automotive exhaust on lung microsomal mixed function oxidase enzyme function and on pulmonary clearance of particulate material, toxicity studies of noble metals, techniques for generating platinum and palladium aerosols and determining them in tissue samples, cardiovascular, pulmonary, and neurophysiological studies on the effects of noble and heavy metals, investigations on the acute lethal and in vitro toxicology of metallic sulfates and on the protein binding properties of palladium and platinum compounds, and experiments assessing the effects of metal sulfates on succinate-dependent respiration in vitro.

1974

55358 **APTIC NO. 76993**

Benvenuti, Francesco and Mario Maggio

LEVELS OF LEAD CONCENTRATION IN BLOOD OF SUBJECTS NOT OCCUPATIONALLY EXPOSED AND RESIDING IN SEVERAL ITALIAN TOWNS. *(I livelli di concentrazione di piombo nel sangue di soggetti non professionalmente esposti, abitanti ni varie citta italiane). Text in Italian. Securitas (Rome), 59(7):487-496, 1974. 13 refs.*

Blood lead levels for 303 non-occupationally exposed residents from 10 towns in Italy were measured to determine the normal blood lead concentration range. The following plumbism distribution was observed: 19.2%, 63.4%, 88.0%, 95.6%, and 98.8% of the subjects showed blood lead levels of less than or equal to 10 gamma/100 cu cm, 20 gamma/100 cu cm, 30 gamma/ 100 cu cm, 40 gamma/100 cu cm, and 50 gamma/100 cu cm, respectively.

55359 **APTIC NO. 79014**

Carsky, J. and J. Kubis

THE USE OF HEMOGLOBIN DENATURATION BY CU(II) IONS FOR BLOOD COHB DETERMINATION. *(Vyuzitie denaturachie hemoglobinu ionmi Cu(II) na urcenie COHb v krvi). Text in Czech. Bratislav. Lekarske Listy, 61(2):169-174, Feb. 1974. 8 refs.*

A photometric method for the determination of carboxyhemoglobin is described. The method involves the denaturation of oxyhemoglobin by an ammonium solution of copper sulfate at a pH of 10.7 and is based on the greater stability of COHb in comparison to other hemoglobin derivatives. Blood concentrations of from 1-10% COHb can be determined with the technique.

55360 **APTIC NO. 77169**

Cederlof, Rune and John Colley

EPIDEMIOLOGICAL INVESTIGATIONS ON ENVIRONMENTAL TOBACCO SMOKE. *Scand. J. Resp. Dis. (Copenhagen), no. 91:47-49, 1974. 2 refs.*

Problems involved in assessing the effects of environmental tobacco smoke on nonsmokers during epidemiological investigations are discussed. Although the prevalence of cough in children is cited as being associated with their parents smoking habits, a close association between the respiratory symptoms of parents who smoke and their children suggests that the child s respiratory condition might be wholly due to the parents respiratory disease. Thus, studies to separate and isolate possible coexisting variables are needed. Another problem involves using carboxyhemoglobin as an index of exposure to tobacco smoke. There may be difficulties in detecting carbon monoxide derived from environmental tobacco smoke against background levels derived from other sources such as automobiles. Psychosocial reactions to tobacco smoke must also be considered in any assessment of the toxic effect of the smoke on nonsmokers.

55361 **APTIC NO. 78983**

Christine, Barbara W., Harold S. Barrett, and Douglas S. Floyd

EPIDEMIOLOGIC NOTES AND REPORTS ANGIOSARCOMA OF THE LIVER - - CONNECTICUT. *Morb. Mortal., 23(24):210, 216, June 15, 1974. 6 refs.*

The epidemiology of six cases angiosarcoma of the liver in Connecticut is discussed. Two of the patients had occupational exposure to polyvinyl chloride (PVC). Another two patients had no occupational exposure, but lived near vinyl products plants. There is no history of occupational or of potential community exposure to PVC for the remaining two patients. Thirteen cases of angiosarcoma of the liver are reported among men engaged in the synthesis of PVC from vinyl chloride monomer. There is evidence that vinyl chloride monomer is the cause of hepatic angiosarcoma in those cases.

55362 **APTIC NO. 79353**

Degueldre, G.

DUST-SAMPLING FROM AN EPIDEMIOLOGICAL POINT OF VIEW. APPLICATION TO PREVALENCE STUDIES ON CHRONIC BRONCHITIS. *(L echantillonnage des poussieres, envisage dans le cadre d une recherche epidemiologique sur la bronchite chronique). Text in French. Acta Tuberc. Pneumol. Belg., 65(1):105-114, Jan.-Feb. 1974. 8 refs.*

Environmental measurements were performed, especially determinations of air pollution in Belgian mines and steel factories, in relation to an epidemiological study on the prevalence of bronchitis symptoms in those industries. The possibilities of applying to medical epidemiological surveys the measuring methods applicable at present in Belgium are also discussed. Comments are made on the measuring techniques for air pollution to be used in steel factories. (Author abstract)

55363 **APTIC NO. 77211**

Evans, Elizabeth and P. J. Nicholls

STUDIES OF THE MECHANISM OF HISTAMINE RELEASE FROM LUNG TISSUE IN VITRO BY COTTON DUST EXTRACTS. *Agents Actions, vol. 45:304-310, 1974. 22 refs. (Presented at the European Branch of the Histamine Club, Annual Meeting, 3rd, Copenhagen, Denmark, May 1974.)*

The histamine releasing activity of cotton dust extracts was investigated in vitro using both human and pig lung tissue. Histamine release increased with increasing concentration of cotton dust in the incubation medium for both species, with the maximum release being 26 and 15%, for human and pig lung, respectively, at a dust concentration of 150 mg/ml. Activity was optimal at 37 C. A pH optimum for release from human lung was observed at 7.4; a pH optimum for pig lung was observed only at low concentrations of the dust. Histamine release increased with increasing pH when pig lung was incubated with a dust concentration (83 mg/ml). A calcium/magnesium-free medium inhibited the release of histamine from pig lung; and, in the absence of glucose, potassium cyanide inhibited the histamine release from both human and pig lung. Cyanide potentiated the effect of high dust concentrations in pig lung, however. The histamine releasing activity of cotton dust in pig lung was inhibited by 2,4-dinitrophenol (in a glucose-free medium), ninhydrin, and N-ethylmaleimide. The dust-induced release of histamine from lung tissue in vitro appeared to be largely due to an energy dependent mechanism. However, at a dust concentration of 83 mg/ml and particularly at an alkaline pH, an energy- independent mechanism may have operated in pig lung. The results are discussed in relation to the occupational pulmonary disease byssinosis. (Author abstract modified)

55364 **APTIC NO. 77148**

Fondimare, A. and J. Desbordes

ASBESTOS BODIES AND FIBERS IN LUNG TISSUES. *Environ. Health Perspect., vol. 9:147-148, Dec. 1974.*

An investigation of the ratio of asbestos bodies to asbestos fibers in human lungs from patients with varying degrees of asbestosis is proposed to determine if the ratio is relatively constant for a given degree of severity. If the ratio is relatively constant for various degrees of asbestosis, then the use of light microscopy for asbestos body counting is suggested as a less time consuming way of quantitatively determining the patient's condition than the use of electron microscopy for asbestos fiber counting. Data on asbestos bodies and uncoated fibers for 14 cases of pleural mesothelioma and 11 cases of severe occupational asbestos with lung fibrosis and squamous carcinoma, as well as for control subjects, are presented. All of the control patients show a few asbestos bodies, whereas patients with severe asbestosis show many thousands of bodies. Cases of mesothelioma lie somewhere in between these two groups. Many uncoated asbestos fibers are observed in all of the cases examined, with a 100 or more fibers being counted for every asbestos body in six patients with severe asbestosis.

55365 **APTIC NO. 76943**

Funabashi, S., Y. Takayama, T. Toba, K. Motomiya, and M. Adachi

EFFECTS OF AIR POLLUTION ON THE HEALTH OF SCHOOL CHILDREN, DETERMINED BY THE NUMBER OF ABSENCES FROM SCHOOL. *(Taiki osen no gakudo no kenko ni oyobosu eikyo - kesseki jokyo karano kansatsu). Text in Japanese. Shoni Hoken Kenkyu (J Child Health), 33(2):43-48, Sept. 1974. 19 refs.*

Fuji City in Shizuoka Prefecture has 170,000 inhabitants and about 1100 paper and pulp factories with high concentrations of sulfur oxides, sodium sulfate dust, and mercaptans. The city was divided into three sections corresponding to yearly average concentrations of SO2 of more than 0.06 ppm, 0.06-0.05 ppm, and less than 0.05 ppm. The study focused on the effects of air pollution on upper respiratory diseases, based on the number of absences of children from school. The number of absences due to upper airway diseases was 70-80% of the total number of absences. The number of the absences due to upper airway diseases and the frequency of morbidity/yr reflected the state of air pollution. A significant correlation was found between monthly morbidity in upper airway diseases and the concentration of SO2 in the highly polluted area. The increase in morbidity in the fall was characteristic, and the effect of age was not clear in the first, third, and sixth year classes.

55366 **APTIC NO. 79459**

Giammanco, G., S. Sciacca, A. Cisternino, and S. Bellassai

LEAD LEVELS IN SAMPLES OF FOETAL CORD AND MATERNAL BLOOD. *(Concentrazioni di piombo in campioni di sangue materno e fetale). Text in Italian. Igiene Mod. (Parma), 67(4):328-334, July-Aug. 1974. 9 refs.*

Lead levels in samples of fetal cord blood obtained from 38 infants at the time of delivery and in samples of venous blood from their mothers were determined. Blood lead levels of mothers living in the urban area of Catania ranged from 9-31 micrograms/100 ml, while those for mothers living in neighboring villages ranged from 16-33 micrograms/100 ml. The lead levels in fetal blood ranged from 6.5-25 micrograms/100 ml (city) and from 11-33 micrograms/100 ml (villages). No statistically significant relationship between blood lead levels and the age or residence of the mothers was demonstrated. The mothers mean blood lead values were higher than those for the infants, being 21.4 micrograms/100 ml for the mothers and 18.3 micrograms/100 ml for the infants living in the urban area. In the rural areas, the mean value for the mothers was 22.5 micrograms/100 ml, while that for the infants was 19.5 micrograms/100 ml. All blood lead levels were lower than the blood lead standards considered as normal.

55367 **APTIC NO. 79438**

Harington, J. S.

FIBROGENESIS. *Environ. Health Perspect., vol. 9:271-279, Dec. 1974. 35 refs.*

In vitro and in vivo studies of asbestos fibrogensis are reviewed. The biochemical events in fibrogenesis appear to be essentially the same whether asbestos fibers are ingested or inhaled; collagen is laid down whenever enough biologically active fibers are present in the tissues. The death of the macrophage is a prerequisite to the subsequent fibrogenesis. All forms of asbestos fibers can stimulate the production of collagen in experimental animals. The fact that glass fiers and other nonasbestos mineral fibers can also do this emphasizes the importance of the fibrous nature of the material rather than its chemical composition. Longer fibers appear to be more fibrogenic than shorter ones, probably because the long ones are less well phagocytosed and transported away.

55368 **APTIC NO. 79118**

Hasinoff, Brian B.

KINETIC ACTIVATION VOLUMES OF THE BINDING OF OXYGEN AND CARBON MONOXIDE TO HEMOGLOBIN AND MYOGLOBIN STUDIED ON A HIGH-PRESSURE LASER FLASH PHOTOLYSIS APPARATUS. *Biochemistry, 13(15):3111- 3117, July 16, 1974. 42 refs.*

The kinetics of the reaction of oxygen and carbon monoxide with hemoglobin (Hb) and myoglobin (Mb) were studied as a function of pressure up to 2760 bar by means of a ruby laser flash photolysis apparatus. The kinetic volumes of activation for the binding of oxygen were both positive: 8 cu cm/mol for Mb and 5 cu cm/mol for Hb. Both were negative for carbon monoxide: -9 cu cm/mol for Mb and -3 and -21 cu cm/mol for Hb fast and slow reactions. The interactions of these two ligands may be different in the transition state. The differing values of the kinetic volume of activation for the fast and slow reactions of Hb with CO indicate that different structural changes occur upon binding. The values of the kinetic volume of activation were rationalized in terms of a stereochemical mechanism for O2 binding and compared with estimates based on the contributions to the kinetic volume of activation that would be expected from consideration of simple model compounds. (Author abstract)

55369 **APTIC NO. 76939**

Homma, S.

LEAD AND LEAD POISONING. *(Namari to chudoku). Text in Japanese. Kankyo Kenkyu (Environ. Studies), no. 7:113-119, June 1974. 20 refs.*

The general properties of lead and its toxicity are described. There is a very small probability that the ordinary population will suffer from plumbism, and the number of patients suffering from plumbism has decreased greatly regardless of the increasing amounts of lead in the environment. The necessity of enforcing preventive measures for plumbism, based on the results of an investigation on workers in the lead processing industry is emphasized.

55370 **APTIC NO. 77151**

Langer, Arthur M.

THE SUBJECT OF CONTINUOUS VIGILANCE. *Environ. Health Perspect., vol. 9:53-56, Dec. 1974. 22 refs.*

Occupational and non-occupational asbestos exposure is discussed. Lung scarring due to occupational asbestos exposure is reported in the literature as early as the 1930 s. Subsequent epidemiological studies in Great Britain show a strong association between occupational exposure, asbestosis, and the development of lung cancer. Chrysotile asbestos is a common air pollutant in large urban areas of the United States, and the possibility exists that asbestos fibers in the air may be associated with an increasing occurrence of lung cancer among the general population.

55371 **APTIC NO. 77170**

Langer, Arthur M.

APPROACHES AND CONSTRAINTS TO IDENTIFICATION AND QUANTITATION OF ASBESTOS FIBERS. *Environ. Health Perspect., vol. 9:133-136, Dec. 1974. 9 refs.*

Approaches and constraints to the identification and quantification of asbestos fibers are discussed. Most of the current work centers on the identification of single, sublight-microscopic fibers present as contaminants in a range of media. Constraints encountered in the analysis of such materials include: sample preparation of the differing media, the level of fiber exposure to contamination, the kind and amount of other particles present with the asbestos fiber, tissue types and their different preparation techniques, the homogeneity of samples and their preparations, the use of proper instrumental techniques, the time required for analysis, and quantification. The analysis of tissue from workmen occupationally exposed to asbestos fibers is easier than that for tissues obtained from non-occupationally exposed persons because of the amount of fiber per unit mass of tissue. The major constraint which presently exists is the signal-to-noise ratio, i.e., the amount of asbestos in a sample as compared to the amount of other particulates which are fibrous in morphology.

55372 **APTIC NO. 79227**

Lauwerys, R., J. P. Buchet, and H. Roels

TOXIC EFFECT OF MODERATE EXPOSURE TO CARBON MONOXIDE. AN IGNORED RISK. *(Les effets toxiques d une exposition moderee au monoxyde de carbone: un risque souvent ignore). Text in French. Louvain Med., 93(4):231-236, 1974. 26 refs.*

Studies on the biological and physiological effects of relatively low carbon monoxide concentrations in the air are reviewed. Numerous recent studies indicate that COHb levels between 5 and 10% can no longer be considered as hygienically irrelevant, as prolonged or repeated exposure to CO concentrations producing such COHb levels may facilitate the develooment of cardiovascular and neurological disorders. Carbon monoxide bound to myoglobin causes cellular hypoxia especially in the myocardium and in brain tissues, which is why the heart and the brain are the most susceptible organs. Promotion of myocardiac ischemia under stress was found in patients with latent coronary sclerosis at COHb levels between 5 and 9%. Carbon monoxide was found to be potentially atherogenic. Behavioral changes, and reduction of mental and sensory capacities were observed in subjects exposed to moderate CO concentrations.

55373 **APTIC NO. 77149**

Le Bouffant, L.

INVESTIGATION AND ANALYSIS OF ASBESTOS FIBERS AND ACCOMPANYING MINERALS IN BIOLOGICAL MATERIALS. *Environ. Health Perspect., vol. 9:149-153, Dec. 1974.*

A method for isolating asbestos fibers contained in biological tissues is described along with some of its applications. The biological material is incinerated in activated oxygen at 150 C, and the ash is then attacked with 1 N hydrogen chloride for 18 hr. The residue is then filtered on a membrane covered with a carbon film. Electron microscopic examination of the deposit allows for the determination of fiber concentrations when the weight or volume of primary material is known. Size analyses are also possible. X-ray diffraction makes possible the determination of the mineralogical nature of the asbestos by comparison with an aluminum reference diagram. These techniques can be used for identifying and counting asbestos fibers in small fragments of lungs and other organs. Most fibers found in the lung are less than 5 micron long. Counts on lungs of asbestos workers give concentrations often greater than 10 million particles/g dry tissue. A comparison of fibers within the tumor with fibers in the adjacent parenchyma for cases of pleural mesothelioma shows only slight differences in particle size but marked differences in their nature, with chrysotile enrichment being observed in the pleural zone. Analysis of pleural plaques reveals many small asbestos fibers after decalcification.

55374 **APTIC NO. 79148**

Loellgen, H., U. Smidt, G. von Nied[illegible] and H. Krekeler

COMPARATIVE STUDY OF CO TRANSFER FACTOR AS DETERMINED BY THE SINGLE-BREATH AND STEADY-STATE METHOD. *(Vergleichende Bestimmung des Transferfaktors fuer Kohlenmonoxyd mit der Single-breath- und der Steady-state-Methode). Text in German. Respiration, 31(6):503-514, 1974. 17 refs.*

The lung transfer factor for carbon monoxide was determined by single-breath and steady-state methods in 201 subjects showing ventilatory impairment in most cases. Neither method reflected the true diffusion capacity of the lungs. The steady-state method, however, appeared to be more suitable as a test for the general assessment of disturbed pulmonary gas exchange.

55375 **APTIC NO. 79460**

Luppi, A., P. Cenci, G. Bucci, G. Perini, P. Maini, L. Bonalberti, E. Kumer, A. Tuffanelli, G. Zanella, I. Piva, and M. T. Fabbri

LEAD ABSORPTION IN A RANDOM SAMPLE FROM RO (PROVINCE OF FERRARA) POPULATION. *(L assorbimento di piombo in un campione della popolazione del comune di Ro (Ferrara)). Text in Italian. Igiene Mod. (Parma), 67(4):351-368, July-Aug. 1974. 31 refs.*

A random sample constituting 5% of the people living in Ro, a rural village in the Province of Ferrara was screened for lead absorption. The sample consisted of 121 females and 128 males of various ages with no occupational exposure to lead. The mean urinary alpha-aminolevulinic acid value for males was 0.38 mg% ml, and that for females was 0.36 mg% ml. The mean urinary lead value for males was 3.77 micrograms% ml, while that for females was 4.12 micrograms% ml. Lead concentrations in the air, soil, water, and some foods were also determined.

55376 **APTIC NO. 77261**

Matsumoto, S., S. Ueda, K. Hayashi, F. Hayashida, H. Tsukune, N. Tsukune, N. Ishii, and T. Hagihara

ULTRASTRUCTURAL STUDIES ON O3 INHALATED LUNG: A COMPARISON BETWEEN TRANSMISSION AND SCANNING ELECTRON MICROSCOPIC OBSERVATION. *J. Clin. Electron Microsc., 7(3-4):398-399, 1974. 2 refs. (Presented at the Sixth Annual Meeting of the Japan Society of Clinical Electron Microscopy.)*

Scanning electron microscopy was used to examine the lungs of adult rabbits and ICR mice that had been inhalated with 10 ppm ozone (O3) for 1 to 6 hr daily for 1 to 28 days. One group was examined immediately, and another three days to six months later. Goblet cells swelled after the inhalation of O3, and then formed granules which showed swelling of the secreting granule and microvilli on the surface of the goblet cells. Cilia showed dewdrop-like swelling due to partial edema, irregular direction, different size and length, changes due to fragility, and disappearance. Where the effect of O3 was strong, craters were seen on the surfaces of cells. Apparently, the secretion had just been released, accompanied by the transition of the ciliated epithelium to secretary cells. Hyperplasia of cells with markedly increased microvilli was seen instead of degeneration and deciduation of cilia. A specific three-dimensional aspect was recognized for hyperplasia of a crowded lump-like cell which is proportional to the hyperplasia of stimulated or immature nonciliated epithelium when observed by light microscopy or transmission electron microscopy. Netz-like structures of washed out mucous were frequently seen and degeneration of the mucous layer due to O3 inhalation was suggested. Irregularity of the alveolar septum due to hyperplasia of cells in the intra-alveolar septum, edema of the intra-alveolar septum, and a marked increase in alveolar phagocytes and alveolar epithelium were seen. Scanning electron microscopy was very useful for three dimensional analysis of conventional microscopic results. (Author abstract modified)

55377 **APTIC NO. 79354**

Minette, A.

INTEREST OF PREVALENCE STUDIES FOR ETIOLOGICAL PURPOSES IN THE FIELD OF CHRONIC BRONCHITIS IN COALMINERS. *(Interet des methodes de recherche de prevalence de symptomes: Application a l etude des facteurs etiologiques de la bronchite chronique chez des houilleurs). Text in French. Acta Tuberc. Pneumol. Belg., 65(1):72-87, Jan.-Feb. 1974. 27 refs.*

Prevalence techniques were used to investigate chronic bronchitis in two different groups of coal miners, selected in different ways at a time interval of a few years, by the same team of interviewers. The first group was chosen in a mining community. The second group was examined at the working place. Both investigations, conducted with the same standardized examination of techniques, gave similar conclusions. The reproducibility of the conclusions illustrates the efficiency of prevalence studies for studying the etiology of chronic bronchitis. (Author abstract)

55378 **APTIC NO. 77159**

Rylander, Ragnar

PERSPECTIVES ON ENVIRONMENTAL TOBACCO SMOKE EFFECTS. *Scand. J. Resp. Dis. (Copenhagen), no. 91:79-87, 1974. 12 refs.*

The effects of environmental tobacco smoke on human health are discussed. The main acute effects are eye and bronchial irritation which may be caused by particulate matter and by certain gases such as formaldehyde, acrolein, and ammonia which are present in tobacco smoke. No studies that provide information on the chronic effects of exposure to tobacco smoke are available. Concentrations of carbon monoxide that are present under realistic environmental conditions may reach about 10 ppm. Exposure to 10 ppm of CO for 8 hr results in a carboxyhemoglobin concentration of about 1.9% which is well below the World Health Organization suggested maximum of 4%.

55379 **APTIC NO. 75920**

Sandermann, Wilhelm

POLYCHLORINATED AROMATIC COMPOUNDS AS ENVIRONMENTAL POISONS. *(Polychlorierte aromatische Verbindungen als Umweltgifte). Naturwissenschaften (Berlin), vol. 61:207-213, 1974. 44 refs. Translated from German, 19p.*

A toxicological review of various polychlorinated aromatic compounds is presented. Topics covered include: the industrial occurrence of such compounds, occupational exposures and resulting health impairments, animal toxicity experiments, and chemical mechanisms involving the toxic action of such compounds. Types of polychlorinated aromatics considered include: chlorinated naphthalenes, chlorinated dibenzodioxins, polychlorinated biphenyls, pentachlorophenol, 2,4,5-

trichlorophenoxyacetic acid, and chlorinated insecticides such as dichlorodiphenyltrichloroethane (DDT).

55380 **APTIC NO. 79424**

Slavin, R. G., Leoni N. Claman, Eloise W. Kailin, Macy I. Levine, Warren J. Raymer, Dale B. Sparks,and Burton Zweiman

GUIDELINES FOR THE ASTHMATIC PATIENT DURING AIR POLLUTION EPISODES. *J. Allergy Clin. Immunol., 55(4):222-223, 1974. 3 refs.*

A general set of guidelines that the asthmatic patient may follow during air pollution epidoses was developed by the Weather and Air Pollution Committee of the American Academy of Allergy. The guidelines include: avoiding smoking and smoke-filled rooms; avoiding exposure to dusts and other irritants, such as sprays, paint, exhaust fumes, smoke from any fire, or other fumes; trying to stay indoors in a clean environment, charcoal filters, air conditioning, and electrostatic precipitators are helpful; and leaving the polluted area if necessary.

55381 **APTIC NO. 77160**

Stewart, Richard D.

THE EFFECTS OF LOW CONCENTRATIONS OF CARBON MONOXIDE IN MAN. *Scand. J. Resp. Dis. (Copenhagen), no. 91:56-62, 1974. 22 refs.*

Carbon monoxide toxicity at concentrations encountered by persons exposed to environmental tobacco smoke is discussed in terms of its mechanism of action and the resulting effects on cognitive function and the cardiovascular system. Carbon monoxide is a chemical asphyxiant which binds reversibly with hemoglobin to form carboxyhemoglobin. The affinity of Hb for CO is about 200-250 times its affinity for oxygen. Decrements in cognitive task performance observed in subjects with COHb saturations of less than 5% are not proven and appear questionable. Rapid increases in COHb saturation to around 9% over 3-120 sec in patients with coronary heart disease appear to cause an increase in the myocardium oxygen extraction ratio and decreases in the coronary sinus tension and the lactate and pyruvate extraction ratios. Compliance with the current air quality standard of 8.7 ppm for 8 hr or 35 ppm for 1 hr appears adequate to protect everyone except persons with near-terminal cardiovascular or lung diseases.

55382 **APTIC NO. 77116**

Suzuki, S.

THE RELATIONSHIP BETWEEN ELEMENTS AND HUMAN BEINGS - NICKEL. *(Hito to hiso no monogatari, Nikkeru). Text in Japanese. Karada no Kagaku (Pop. Med.), no. 60:168-170, Nov. 1974.*

Following a description of the merit and usefulness of metallic nickel and nickel carbonyl, the problem of environmental nickel, especially nickel, contained in floating dust, which range from 0.011 microgram/cu m of air in Sendai City to 0.076 microgram/cu m of air in the industrial city of Osaka (annual average) and nickel contained in cigarettes amounting to 2 microgram per piece is discussed. There is a high morbidity of lung cancer in the workshop of nickel refineries and a long induction period of causing lung cancer.

55383 **APTIC NO. 77164**

Suzuki, Yukio, Yasuo Suzuki, and Takaji Mohri

A STUDY OF DEATH RATE OF MALIGNANT NEOPLASMS OF INHABITANTS LIVING AROUND A SMELTERY. *(Bo seiren kojo shuhen chiiki jumen no akusei shinseibutsu shiboritsu chosa). Text in Japanese. Shikoku Igaku Zasshi (Shikoku Acta Medica), 30(3):207-212, June 1974. 19 refs.*

Mortality rates for individuals with malignant neoplasms who had lived near a smelter in Ooita Prefecture were surveyed and compared with those of the general population in Japan for the period 1965-1971. The study group exhibited a significantly increased rate of neoplasms in the buccal cavity, pharynx, biliary passages, and liver, regardless of sex. Neoplasms of the trachea, bronchus, and lung were elevated in males only. Increased mortality rates were also associated with neoplasms of the skin, urinary bladder, and kidney. Mortality due to malignant neoplasms of the biliary passages, liver, trachea, bronchus, and lung was concentrated among males over 55 yr and females over 70 yr in age.

55384 **APTIC NO. 77161**

Taylor, Geoffrey

TOBACCO SMOKE ALLERGY - DOES IT EXIST? *Scand. J. Resp. Dis. (Copenhagen), no. 91:50-55, 1974. 20 refs.*

Tobacco smoke allergy is discussed in terms of evaluations of the response of atopic individuals, dose differences, sensitization, and individual susceptibility. Reactions involving the respiratory tract are not uncommon in passive smokers; and atopic individuals react more than non-atopic individuals, though the true incidence of the problem is not known with certainty. Although there are many agents in tobacco smoke which can theoretically act as haptens and induce an immunological response after binding to a suitable carrier molecule, there is no proof that specific sensitization to tobacco smoke exists. The increased responsiveness of atopic individuals to tobacco smoke may well be due to other non- immunological mechanisms. Research to determine the incidence of clinical reactors to tobacco smoke in normal populations and to investigate the mechanism of the reaction is recommended. (Author conclusions modified)

55385 **APTIC NO. 76941**

Tsunetoshi, Y.

EPIDEMIOLOGY OF AIRWAY DISEASES DUE TO ENVIRONMENTAL POLLUTION. *(Kankyo osen ni yoru kidokei shikkan no ekigaku). Text in Japanese. Nihon Kikan Shokudo-ka Gakkai Kaiho (J. Japan. Broncho-Esophagolog. Soc.), 25(4):162-163, Sept. 1974. (Presented at the Japan Broncho-Esophagological Society, Annual Meeting, 26th, Hirosaki, Japan, Sept. 7-8, 1974.)*

Among the various effects of air pollution on the human body, the chronic effects due to exposure to relatively low concentrations of pollution are the most important problem. The results of an epidemiological investigation on chronic bronchitis performed in Osaka City are discussed. There was a relationship between the morbidity of chronic bronchitis (*y*), age (x), concentration of sulfur dioxide (alpha) in the air y equals 10 to the minus fourth power times 3 times N times the square of (X-20)+1.94 alpha-3.18. When the air pollution was heavier, the disease was more severe.

55386 **APTIC NO. 75911**

Vanuni, S. O.

COMPARATIVE CHARACTERISTICS OF INDIVIDUAL AND TOTAL AMINO ACIDS IN THE BREAST MILK OF WORKING NEW MOTHERS AND WOMEN LIVING IN SURROUNDING VILLAGES AT VARIOUS DISTANCES FROM A SYNTHETIC CHLOROPRENE RUBBER COMBINE. *(Sravnitel naya kharakteristika individual nykh i summarnykh aminokislot v grudnom moloke rodil nits-rabotnits i zhenshchin prozhivayushchikh v okruzhauyshchikh selakh na raznom rasstoyanii ot kombinata sinteticheskogo khloroprenovogo kauchuka). Zh. Eksperi. i. Klinich. Meditisiny, 14(1):96-101, 1974. 11 refs. Translated from Russian, 6p.*

The amino acid content of the milk from 170 women (8th day of lactation) either working in a synthetic chloroprene rubber works or residing near the facility was measured and compared with that of a control group. The exposed mothers showed decreases in amino acid content both in terms of total protein content of the milk and in terms of amino acids per volume of milk. The former was decreased by about 13%, while the latter was decreased by about 30%. The reduction in amino acid content of the milk is apparently connected with a depression of the lactation function of the milk glands against a background of chloroprene intoxication.

55387 **APTIC NO. 79117**

Wickstrom, G.

PROTECTIVE MECHANISMS IN THE RESPIRATORY ORGANS AGAINST AIR POLLUTION. *(Hengityselimiston suojautuminen ilman epapuhtauksia vastaan). Text in Finnish. Duodecim (Helsinki), vol. 90:972-978, 1974.*

The human respiratory system is prepared for increases in air pollution, but only up to a point. The most important protective mechanisms of the upper respiratory tract are ciliary action and the production of protective mucous. In the lungs, the macrophage phagocytosis can eliminate the effect of impurities. However, too much pollution and certain poisons directed at the protective mechanism, can break down the natural defensive system. Impurities in the air can be divided into three groups: solid particles, liquid particles, and gases. Generally speaking, the respiratory system has no effective protection against gaseous impurities. Larger particles are removed from respired air in the nose by the mucous membranes. Gravitational settling of particulates occurs in the tracheo- bronchial section. The respiratory tract is cleaned by the mucociliary system. The ciliary action is affected by several factors; certain drugs, such as Digitalis, and particulate impurities in the air increase the action; other drugs, such as atropine, and gases, such as ammonia, formaldehyde, and sulfur dioxide, slow it down or stop it. Alveolar macrophages take care of cleaning the pulmonary areas. The macrophages absorb foreign substances, break them up in their protoplasm and carry them away from the alveoli. When impurities appear in breathing air, the macrophage system intensifies its operation. Coughing and sneezing are also ways of cleaning breathing passages.

55388 **APTIC NO. 76937**

Mie Prefectural Office (Japan)

THE RELIEF MEASURE OF HUMAN DISTURBANCE DUE TO ENVIRONMENTAL POLLUTION I. STATUS QUO OF HEALTH DISTURBANCE. *(Kogai higai no kyusai taisaku I. Kenkohigai no genkyo). Text in Japanese. In: The Environmental White Paper 1974, Mie Prefecture, p. 229-238, 1974.*

According to a law, the area from the coastal zone to the center of Yokkaichi City (population 100,000) was selected as the district where national relief measures would be taken. The number of officially recognized patients suffering from air pollution was 1023 at the end of March 1974 (406, 466, 640, 817, and 961, respectively, in 1968, 1969, 1970, 1971, 1972, and 1973). The number of newly recognized patients was, on a monthly average, 16.3% in 1971, 15.2% in 1972 and 7.8% in 1973, showing a yearly decrease. The classified percentages of patients were 43.2% with bronchial asthma and 33.7% with chronic bronchitis. The classified patients by age was 19.9% in their forties and fiftes, 13.5% over 70, 11.6% ages 9-11 yr, and 11.5% of ages 6-8 yr. The decrease in the number of patients coincides with the reduction of air pollution.

55389 **APTIC NO. 76940**

RECENT STATES OF INJURIES DUE TO AND REGULATION OF NOX. *(NOx no higai jokyo to kisei). Text in Japanese. Sangyo to Kankyo (Ind. Environ.), 3(9):36-41, Sept. 1974.*

While the generation of sulfur dioxide is decreasing, and that of nitrogen oxides is increasing yearly. In the case of oxidants, which are second in volume to NOx, the size of the generating area and the number of instances of generation are increasing. The frequency of oxidant alerts was 7, 98, 176, and 328 in Japan in 1970, 1971, 1972, and 1973. The total number of patients who reported their complaints officially was 17,887, 48,118, 21,245, and 31,966 in 1970, 1971, 1972, and 1973. The majority of patients were middle-schoolchildren and primary-schoolchildren representing 53% and 25-29%, respectively, of the patients.

55390 **APTIC NO. 77041**

Tokyo Bureau of Public Health (Japan)

STATES OF NOTIFICATION OF HUMAN INJURIES DUE TO PHOTOCHEMICAL SMOG, 1974. *(Showa 49 nendo, Kokagaku smog higai todokede jokyo). Text in Japanese. 6p., Dec. 1974.*

From April to October 1974, 2711 persons reported injuries due to photochemical smog 118 times in the Tokyo metropolitan area. Of them, 91.4% were by schoolchildren. Notification was most frequent (64.4%) in May. Notification was most frequent in the center of the metropolitan area. When the oxidant concentration was more than 0.15 ppm, the number of notifications was 2457 (90.6%). The injuries occurred most frequently from noon to 2 pm (1453 persons). The highest number of notifications occurred on May 18, 1974.

55391 **APTIC NO. 79145**

Wisconsin Medical Coll., Milwaukee, Dept. of Environmental Medicine

EXPOSURE OF HUMANS TO CARBON MONOXIDE COMBINED WITH INGESTION OF ETHYL ALCOHOL AND THE COMPARISON OF HUMAN PERFORMANCE WHEN EXPOSED FOR VARYING PERIODS OF TIME TO CARBON MONOXIDE (FINAL REPORT). *Coordinating Research Council and Environmental Protection Agency Contract CRC-CAPM-3-68, Rept. CRC-APRAC-CAPM-3-68-6, MCOW-ENVM-CO-74-2, 41p., Aug. 14, 1974. 7 refs.*

The effects of carbon monoxide and ethyl alcohol, either alone or in combination, on the behavioral test performance of healthy male and female adult subjects were investigated. A dose level of 1.6 ml of 100 proof alcohol/kg body weight and a carboxyhemoglobin level of approximately 14% were chosen. Tests of coordination, arithemetic ability, inspection, manual dexterity, time estimation, and vigilance did not reveal any deleterious effects on behavior associated with either 5-1/2-hour exposures or 24-hour exposures to carbon monoxide. Alcohol did not appear to potentiate the effect of carbon monoxide. The only positive finding was that alcohol adversely affects eye-hand coordination. (Author abstract modified)

1973

55392 **APTIC NO. 79115**

Ebato, T.

AIR POLLUTION AND DISEASES OF RESPIRATORY ORGANS. PART 2. PATHOLOGY: PATHOLOGICAL DIAGNOSIS OF LUNGS OF URBANITES. *(Taiki osen to kokyuki shikkan. 2. Byori: Toshi seikatsu-sha no hai byori shoken o chushin to shite). Text in Japanese. Nippon Kyobu Shikkan Gakkai Zasshi (Japan. J. Thoracic Dis.), 11(12):713-718, Dec. 1973. (Presented at the Japan Society of Chest Diseases Symposium II, 13th, Japan, April 1973.)*

Lung tissues from 321 autopsy cases performed at Hirao Hospital and Tokyo University Hospital during the period of March 1958 to Feb. 1972 were examined. Specimens fixed in formalin, sliced by paraffin method, and stained were observed using optical and polarization microscopes. Cases of carbon dust ailment, dust lung tuberculum, chronic bronchitis, pneumonia interstitialis, lung cancer, squamatization of bronchial mucous membranes and smooth muscle hyperplasia of vesicular walls were investigated. Data obtained were analyzed with regard to the age group and residential area. The ratio of lung ailment among urbanites was unexpectedly high, particularly in younger groups. Carbon dust ailment and dust lung tuberculum cases were found more in the Jonan area where the amount of sedimented dust was generally higher; however, in the last three years many cases were found in other areas, indicating the extent of air pollution. The chronic bronchitis and pneumonia interstitialis showed no regional differences, suggesting the effect of automotive exhaust gas rather than sedimented dust. An increasing trend in squamous cell carcinoma was observed, and its regional characteristics were similar to the case of carbon dust ailment and dust lung tuberculum.

55393 **APTIC NO. 79197**

Horita, Naoki

EXAMINATIONS OF CAT S WHITE AND GRAY MATTER WITH LESIONS INDUCED BY UNILATERAL COMMON CAROTID LIGATION FOLLOWED BY CARBON MONOXIDE INHALATION. *(Issanka tanso chudoku jikken; issanka tanso kyunyugo no katagawa sokeidomyaku kessatsu neko ni okeru hakushitsu oyobi hishitsu no soshiki byorigaku teki kosatsu). Text in Japanese. Seishin Shinkeigaku Zasshi (Psychiat. Neurol. Japan., 75(9):575-605, 1973. 115 refs.*

Effects of carbon monoxide poisoning on the white substance and cortex of cat s cerebrum with lesions induced by unilateral common carotid were investigated by varying the CO concentration, exposure time, and survival period after the exposure. Perfused and fixed brain tissues were examined using optical and electron microscopes. Histopathological lesions including edematization, tumescence, gliofilament, glucogen granule, satellite glia, axis cylinder, degradation of myelin sheath, diffuse Odemnekrose and CO-myelinopathie were examined. The relationship between white substance lesion and cortex lesion was analyzed. The causes of CO-poisoning lesion are discussed. Photomicrographs and electron micrographs are included.

55394 **APTIC NO. 79226**

Ohnesorge, F. K.

TOXICITY OF CADMIUM. *(Zur Toxizitaet von Cadmium). Text in German. Schriftenreihe Ver. Wasser- Boden- Luft-Hyg., vol. 40:131-147, 1973. 145 refs.*

Toxicological studies on cadmium and its distribution in the environment are reviewed. Compared with a daily cadmium intake of 100-500 micrograms, the intake from air is negligible, amounting to only 1 microgram/day, even in large cities. Foods are responsible for 60-70% of the total cadmium load, while drinking-water, air, and tobacco smoke account for 10-20%, less than 1%, and 0-10%, respectively. Some 11-40% of the inhaled cadmium is assumed to be retained in the organism, which corresponds to about 10% of the total quantity absorbed. Once absorbed, cadmium accumulates in the organism. Its half-life between 1 yr and over 30 yr. Cadmium is accumulated mainly in the kidneys and in the liver. Hypertension, pulmonary edema, emphysema, pneumonia, insterstitial lung fibrosis, hypochromic anemia, increased erythrocyte sedimentation reaction, increased serum alkaline phosphatase activity, impairment of the hepatic function, renal lesions, proteinuria, interference with spermatogenesis, necrosis of the testes, and disturbances in proteolysis were determined as the principal toxic effects of cadmium in the human and animal organism. Cadmium was found to be carcinogenic and teratogenic in animal tests. The ADI for cadmium is proposed to be set between 0.4 and 4 microgram/kg, which implies that any further increase in the cadmium level in foods is unacceptable.

55395 **APTIC NO. 79073**

Parkes, W. Raymond

ASBESTOS-RELATED DISORDERS. *Brit. J. Diseases Chest, 67(4): 261-300, 1973. 135 refs.*

The three types of asbestos; chrysotile, crocidolite, and amosite, are described. The uses of asbestos are outlined, including acoustic and thermal insulation. Exposure to asbestos is divided into occupational, para-occupational, and environmental categories. The biological behavior of asbestos and its aerodynamic properties, which determine its behavior in lung airways are described. There is a fairly strong correlation between the presence of pleural plaques and exposure to all commercial types of asbestos. The most important factors in the development of asbestosis (fibrosis of the lungs due to inhaled asbestos dust) are the amount of dust to which an individual is exposed and the duration of this exposure. Asbestosis increases the risk of lung cancer. Air pollution in the vicinity of crocidolite mines and factories processing asbestos mixtures has occurred in the past and has been associated with malignant mesothelioma of the pleura and peritoneum, but the source of exposure has usually been occupational. Unilateral basal pleural effusions are sometimes encountered in asbestos workers with no evidence of asbestosis; they usually resolve slowly and completely or leave some residual pleural thickening. Death rates from lung cancer are higher among asbestos workers, especially those who smoke, than among the general population. There is no satisfactory evidence for a relationship between asbestos exposure and other types of neoplasia. Preventive measures are discussed, including standards for handling and working with asbestos, substitution of another material, monitoring airborne levels, and annual medical examinations for asbestos workers.

55396 **APTIC NO. 77081**

Stein, G., S. Juehe, C. -E. Lange, and G. Veltman

SKELETAL CHANGES IN SO-CALLED VINYL CHLORIDE DISEASE. *(Skelettveraenderungen bei der sogenannten Vinylchlorid- Krankheit). Text in German. Roentgenbl., 26(8):350-355, 1973. 16 refs.*

Workers exposed to vinyl chloride and other substances occurring or used during the polymerization process were examined for skeletal and other changes. Atrophy, osteoporosis, bandlike osteolysis of the phalanges, arthritis of the iliosacral joints, and bone cysts were found in the hands and feet of 10 workers. The bandlike osteolysis of the terminal phalanges were found to be typical of vinyl chloride disease. In another 72 PVC workers, bone atrophy or osteoporosis was found in 3 cases, Raynaud s syndrome, scleroderma-like skin changes in the extremities and face, ventilation problems, lesions of the hepatic parenchyma, splenomegalia, thrombocytopenia, abnormal thrombocyte function, slight reticulocytosis, and an increase of certain immunoglobulin fractions were detected in 6 cases of bandlike osteolysis of the phalanges. Partial regression of the skeletal alterations after termination of the exposure was noted.

1972

55397 **APTIC NO. 79033**

Astrup, Poul, Dyre Trolle, H. M. Olsen, and Knud Kjeldsen

EFFECT OF MODERATE CARBON-MONOXIDE EXPOSURE ON FETAL DEVELOPMENT. *Lancet, 1972:1220-1222, Dec. 9, 1972. 12 refs.*

The effect of moderate carbon monoxide exposure on rabbit fetal development was examined along with birth weight statistics and carboxyhemoglobin values for non-smoking and smoking mothers. Exposure of pregnant rabbits to 180 ppm CO (16-18% carboxyhemoglobin) resulted in a 20% decrease in birth weight and a neonatal mortality of 35% as opposed to 1% for a control group. Exposure to 90 ppm CO (8-9% carboxyhemoglobin) resulted in a birth weight decrease of 11% as compared with that of controls. The neonatal mortality increased from 4.5-9.9%. The studies among smoking and non-smoking mothers revealed a mean birth weight of 2990 g for the smoking group as compared with a birth weight of 3225 g for the non-smoking group. There was a negative correlation between birth weight and the mean carboxyhemoglobin value for each individual.

55398 **APTIC NO. 76951**

Chin, Shin Ton, Y. Nakajima, and S. Kusumoto

OCCURRENCE OF CHRONIC BRONCHITIS IN MICE EXPOSED TO NITROGEN DIOXIDE AT 0.3-0.5 PPM. *(0.3-0.5 ppm NO2 bakuro ni yoru mouse no manseikikanshien no hassei). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):194, Nov. 1972.*

The change of the respiratory system of mice (3 wk after birth) exposed to nitrogen dioxide at 0.3-0.5 ppm for 6 mo, then removed to a clean air chamber and kept there for 1 and 3 mo respectively was histologically observed and compared to those reared in a clean air room for 7 mo. In spite of no abnormal findings on the trachea and lung of control animals, the accentuation of mucous secretion and the proliferation and ablation of mucosal epithelium of trachea was found in the exposed animals. On animals kept in clean air for one month after exposure, lymphocytic infiltration was observed in the mucous layer and submucosal tissue in addition to epithelial ablation. After being kept for 3 mo in clean air, the ablation became obscure, but the infiltration became conspicuous. Just after exposure, the ablation and the destruction of bronchiolar epithelium and obstruction of tubules were observed. After keeping the exposed animals in clean air, the changes were gradually restored, but, even after 3 mo, ablasive bronchiolitis and small foci of lymphocytic infiltration were observed. The findings demonstrated the occurrence of chronic tracheitis and chronic bronchitis by long-term exposure to nitrogen dioxide as low as 0.3-0.5 ppm in concentration.

55399 **APTIC NO. 79023**

Deleanu, M.

ASSAYS ON THE APPLICATION OF ATMOSPHERIC ION THERAPY IN HYPERTENSION AND HYPOTENSION. *(Essais d application de l aeroionotherapie dans l hypertension et l hypotension). Text in French. Cahiers Assoc. Fr. Biometeorol. (Paris), 5(2):5-8, 1972. 9 refs.*

The effect of negative atmospheric ion therapy on 19-25-yr-old hypertonic and hypotonic students was studied. Hypertonic patients exposed to small atmospheric ions (10,000 negative ions/cu ml, and 1000 positive ions/cu ml) for 15-20 min daily for 13-20 days showed a statistically significant drop in systolic and diastolic pressure by the end of the therapy and during the 9-wk follow-up period. A slight but statistically significant increase in the systolic and diastolic pressures was observed in hypotonic patients exposed to the same ion concentrations for 15-25 min daily for 12 days at the end of the therapy and during the 5 following weeks. The corrective action of negative ionization is apparently due to a non-specific interaction with biological regulatory mechanisms.

55400 **APTIC NO. 79005**

Konradova, V.

THE ULTRASTRUCTURE OF THE TRACHEAL EPITHELIUM IN RABBITS FOLLOWING THE INHALATION OF AEROSOLS OF COLLOIDAL SOLUTIONS OF HEAVY METALS. III. A CONTRIBUTION TO THE STUDY OF THE REGENERATION OF THE TRACHEAL EPITHELIUM. *Folia Morphol. (Prague), 20(4):389-396, 1972. 22 refs.*

The ultrastructure of tracheal epithelium from 12 3-month-old rabbits exposed to aerosols of colloidal solutions of iron for 8 hr was examined using electron microscopy. Flat, undifferentiated cells appeared on the epithelial surface two hr after exposure, though they disappeared during the next 6 hr. Altered and degenerated cells which were observed in maximum numbers 8 hr after exposure also disappeared from the epithelium within 26 hr. The maximum number of differentiating cellular elements was observed 8 hr after exposure; this number returned to normal by the end of the experiment, however. Pseudostratified ciliated epithelium was restored 26 hr after exposure, although surface irregularities and deep crypts and recesses were observed in the regenerated epithelium. Foreign substances which were initially concentrated in vacuoles of increasing size were completely absent from the epithelium in the course of 26 hr. Free phagocytic cells which appeared after exposure in dilated intercellular spaces and in the loose connective tissue of the lamina propria mucosae also disappeared later. Only mature plasma cells in the subepithelial zone were still present at the end of the experiment.

55401 **APTIC NO. 75924**

Poteriaeva, G. E.

SUBSTANTIATING DATA ON THE MAXIMUM PERMISSIBLE CONCENTRATION OF HEXACHLOROBUTADIENE IN THE ATMOSPHERE OF INDUSTRIAL PREMISES. *(Materialy y obosnovaniyu predel no dopustimoy kontsentratsii geksakhlorbutadiyena v vozduke proizvodstvennykh pomescheniy). Gigiena i. Sanit., vol. 37:32-36, Feb. 1972. 7 refs. Translated from Russian, 8p.*

Various laboratory animals were exposed by several routes (respiratory, peroral, skin) to acute and chronic doses of hexachlorobutadiene to establish a maximum permissible concentration in industrial atmospheres. Concentrations of 0.026 mg/l over the course of 1 mo were highly toxic and resulted in the death of 50% of the laboratory animals. Disorders were especially associated with the central nervous system, respiratory function, and the gastrointestinal tract. A maximum permissible concentration of 0.00001 mg/l of HCBD is recommended for working atmospheres.

1971

55402 **APTIC NO. 75917**

Masakuni, Suzukim and Norio Murai

FETAL POLLUTION DISEASES. *Taiji Kogai Biyo (Clincal Prenatal Fetal Illness), 20(10):956-958, 1971. 25 refs. Translated from Japanese. Leo Kanner Assoc., Redwood City, Calif., 14p., April 1975.*

The effect of environmental pollution on the health of the human fetus is examined. High rates of newborn malformations are observed for mothers exposed to insecticides. Weed killers are known to induce malformations in experimental animals. Prenatal malformations due to radiation treatment of the mother during pregnancy are also recorded. Fetal illness is also discussed in relation to noise, medication during pregnancy, and maternal stress during pregnancy.

55403 **APTIC NO. 77067**

Viola, P. L., A. Bigotti, and A. Caputo

ONCOGENIC RESPONSE OF RAT SKIN, LUNGS, AND BONES TO VINYL CHLORIDE. *Cancer Res., vol. 31:516-519, May 1971. 12 refs.*

Male Wistar rats (3-months old) were exposed for 12 mo (4 hr/day, 5 days/week) to air containing 3% (by volume) vinyl chloride vapors, to assess the oncogenic response of skin, lungs, and bones to the chlorinated hydrocarbon. Skin tumors were by far the most frequent, amounting to 65-70%. The cutaneous tumors, which always appeared in the area where the submaxillary and parotid glands are located, were histologically recognized as epidermoid carcinomas, papillomas, and mucoepidermoid carcinomas. Lung tumors, which occurred less frequently, were mainly of the adenocarcinoma type, with the exception of a single epidermoid tumor originating from the epithelial covering cells. A large proliferation of cartilaginous tissue which was diagnosed as osteochondroma developed in a minor number of rats and was observed in the metacarpal and metatarsal regions of the four limbs. (Author summary modified)

EFFECTS-PLANTS AND LIVESTOCK

1975

55404 **APTIC NO. 79067**

Botkin, Daniel B.

NATURAL ECOSYSTEMS AND THE INDUSTRIAL PRODUCTION OF CARBON DIOXIDE. *In: Mineral Resources and the Environment. Appendix to Section III. Report of Panel on the Implications of Mineral Production for Health and the Environment. National Academy of Sciences, Washington, D. C., Committee on Mineral Resources and the Environment, Department of the Interior and National Science Foundation Contract S0122128, D73,123C, C310-285-000, p. D.1-D.24, Feb. 1975. 17 refs.*

NTIS: PB 239582

The effect of carbon dioxide on the earth s biota is discussed. Little data regarding the actual net removal of CO2 from the atmosphere by land biota exists, although it is estimated that the minimum combined effects of the land biota and the oceans result in the removal of about 49% of the anthropogenic CO2 emitted to the atmosphere. Simulation experiments suggest that if the fertilization effect of an increase in CO2 concentration is uniform across different tree species in a forested area, then changes in the biomass of a forest are not likely to be observed unless the CO2 increase is sufficient to fertilize the annual growth of each tree approximately 50% above normal. Regarding fresh water ecosystems, the rate of photosynthesis of algal communities may be limited by the rate of CO2 movement into the lake from the air above when the total dissolved inorganic carbon in a lake is low. In general, the biota of the earth may be potentially a major sink for the CO2 added to the atmosphere by man s activities, and added CO2 may exert a significant effect on the production and standing crop of biota.

55405 **APTIC NO. 79548**

Davis, D. D. and S. H. Smith

BEAN COMMON MOSAIC VIRUS REDUCES OZONE SENSITIVITY OF PINTO BEAN. *Environ. Pollut., 9(2):97-101, Sept. 1975. 10 refs. (Presented at the International Congress of Plant Pathology, 2nd, Minneapolis, Minn., Sept. 4-12, 1973.)*

The effect of bean common mosaic virus infection on the sensitivity of pinto bean to ozone damage was investigated. Immature primary leaves inoculated with the virus 5 days prior to exposure with 0.25 ppm O3 for 4 hr shows less O3 injury than the non-infected control plants. Protection is influenced by the initial inoculum dilution and by the length of time between inoculation and exposure to O3. (Author abstract modified)

55406 **APTIC NO. 76998**

Dorn, C. Richard, James O. Pierce, Gerald R. Chase, and Patric E. Phillips

ENVIRONMENTAL CONTAMINATION BY LEAD, CADMIUM, ZINC, AND COPPER IN A NEW LEAD-PRODUCING AREA. *Environ. Res., 9(2):159-172, April 1975. 25 refs.*

Environmental contamination by lead, cadmium, zinc, and copper in a new lead-producing area of southeastern Missouri was statistically studied on a test farm approximately 800 m from the source of metal emissions and on a control farm located outside the area of contamination. Dustfall, soil, root, and vegetation tops were collected four times during a 1-year period at varying distances from a highway on the test farm as well as on the control farm, and blood and milk samples from cows on each farm were collected and analyzed for the metals. Soil lead concentrations at the test farm were as high as 8.1 times those at the control farm. High lead and cadmium dustfall and air filter samples at the test farm corresponded to wind conditions favoring the transport of metal emissions from their source to the farm. The main sources of the metals were stack emissions from a lead smelter, lead ore concentrate spillage from trucks, and dust from stockpiled ore at the smelter. The highest dustfall, soil, and vegetation levels and the greatest increase in lead levels in the test cows occurred during the winter season. The mean blood lead concentration of the test cows was about four times greater than that of the control cows. There was no apparent buildup in the lead concentration at each step in the translocation from soil to roots to tops on the control farm, whereas on the test farm the concentration of lead in plant roots was 2.6 times higher than the soil, and unwashed vegetation tops were 2.5 times higher in lead than their roots. (Author abstract modified)

55407 **APTIC NO. 77175**

Engst, Rudolf and Walter Fritz

ENVIRONMENTAL POLLUTION OF FOODSTUFFS BY CANCEROGENIC HYDROCARBONS. *(Zanieczyszczenie zywnosci weglowodorami rakotworczymi pochodzacymi ze srodowiska). Text in Polish. Roczniki Panstwowego Zakladu Higi., 26(1):113-118, 1975. 27 refs.*

Vegetables, fruits, and soil samples from areas with varying degrees of motor vehicle traffic and industrial pollution were analyzed to assess the degree of contamination by carcinogenic polynuclear aromatic hydrocarbons. The degree of plant contamination paralleled the degree of soil contamination, with the concentration of polynuclear aromatics increasing with increased densities of motor vehicle traffic and industrial pollution. The benzo(3-4)pyrene content of soil from areas with little traffic and industry was ranged from 5-700 micrograms/kg and increased up to 3000 micrograms/kg near main roads. Soil levels of 650,000 micrograms/kg were measured near a factory. Maximum benzo(3-4)pyrene values of 150 micrograms/kg (dry weight) were measured in lettuce leaves.

APTIC NO. 77134

awa, A. and M. Kadota

EFFECT OF OZONE ON PHOTOSYNTHESIS AND RESPIRATION IN POPLAR LEAVES. *Environ. Control Biol., 13(1):1-7, March 1975. 23 refs.*

Experiments were carried out to determine the effect of ozone fumigation on the rate of carbon dioxide (CO2) exchange of detached poplar leaves in the light (24 klux) and in the dark. The detached poplar leaf was placed in an assimilation chamber, and the CO2 concentration of the air at the inlet and outlet was measured by an infra-red CO2 analyzer. The rate of CO2 exchange was determined before and after exposure to 0.9 ppm ozone at 25 C at an air flow rate of 1.5 l/min. Both net photosynthesis and CO2 evolution in the light were considerably decreased. However, dark respiration was increased after the ozone fumigation. The light and CO2 compensation points were significantly higher in the ozonated leaves. (Author abstract modified)

55409 **APTIC NO. 79368**

Galloway, H. L., R. E. Shoaf, and C. H. Skaggs

A RAPID METHOD FOR THE DETERMINATION OF FLUORIDE IN VEGETATION. *Am. Ind. Hyg. Assoc. J., 36(10):721-724, Oct. 1975. 7 refs.*

An analytical procedure for the determination of fluoride in vegetation was developed. The method involves leaching the vegetation with a hot solution of strong base and then determining the fluoride in an acidified solution directly with a fluoride selective ion electrode. The average value for 14 determinations is 24.4 micrograms F/g sample. The calculated standard deviation of the method based on these analyses is + or - 1.4 micrograms F/g sample, and the relative standard deviation is + or - 5.8%. This corresponds to a limit of error of 13% at the 95% confidence interval. (Author abstract modified)

55410 **APTIC NO. 77142**

Hagiwara, M.

STATUS QUO OF SCALE INSECTS IN AIR-POLLUTED AREAS, PART II. *(Taikiosen chitai no kaigaramushi rui no jittaichosa (II)). Text in Japanese. Preprint, Japan Forestry Society Tokyo (Japan) p. 454-455, 1975. (Presented at the Japan Forestry Society, Annual Meeting, 86th Kyushu, Japan, April 2-3, 1975.)*

In shrines, temples, public gardens, and forests along the main roads in the Tokyo metropolitan area and the Kanagawa, Saitama, Gunma, Yamanashi, and Shizuoka Prefectures, which are located within a circle of 100 km, diameter with its center at Tokyo, the status quo of scale insects (species and number of parasities) was investigated in 3 trees of Pinus thunbergii at a monitoring point. The scale insect investigated was Doliaspis pini. At 21 locations including 6 places on Miyake island, the number of parisites of D.p. was higher on P.t. growing on or near roads where traffic was heavy, the distance from the metropolitan center notwithstanding.

55411 **APTIC NO. 79546**

Heagle, Allen S.

RESPONSE THREE OBLIGATE PARASITES TO OZONE. *Environ. Pollut., 9(2):91-95, Sept. 1975. 9 refs. (Presented at the International Congress of Plant Pathology, 2nd, Minneapolis, Minn., Sept. 4-12, 1973.)*

The effects of ozone on crown rust of oats caused by Puccinia coronato var. avenae, stem rust of wheat caused by Puccinia graminis f. sp. tritici, and powdery mildew of barley caused by Erysiphe grammis f. sp. hordei. were investigated. Ozone at concentrations often found in the ambient air of certain areas, inhibits various phases of the asexual cycle of the two rust fungi and of the powdery mildew fungus. With the rust fungi, O3 inhibits sporulation but does not affect germination and infection by exposed spores. With the mildew fungus, O3 does not affect sporulation or germination but does inhibit infection by exposed spores. (Author abstract modified)

55412 **APTIC NO. 77024**

Jaeger, Hans-Juergen

EFFECT OF SO2-FUMIGATION ON THE ACTIVITY OF ENZYMES OF THE AMINO ACID METABOLISM AND THE FREE AMINO ACID CONTENTS IN PLANTS OF DIFFERENT RESISTANCE. *(Wirkung von SO2-Begasung auf die Aktivitaet von Enzymen des Aminosaeurestoffwechsels und den Gehalt freier Aminosaeuren in unterschiedlich resistenten Pflanzen). Text in German. Z. Pflanzenkrankh. Pflanzenschutz, 82(3):139-148, 1975. 55 refs.*

The effect of sulfur dioxide on the activities of enzymes in amino acid metabolism was investigated in test plants of varying susceptibility to SO2. The concentrations of the free amino acids and that of the diamine putrescine were also determined. The concentration of the free amino acids was significantly altered, especially the concentration of these in the glutamate family. The glutamate dehydrogenase became activated (reduction amination) in SO2-fumigated plants, whereas glutamate oxalacetate transaminase and glutamate pyruvate transaminase were inactivated. The reasons for this difference in resistance towards SO2 are discussed as well as the mechanism of the effects of SO2 on amino acid and diamine metabolism.

55413 **APTIC NO. 77015**

Kjellstrom, Tord, Birger Lind, Lars Linnman, and Carl-Gustaf Elinder

VARIATION OF CADMIUM CONCENTRATION IN SWEDISH WHEAT BARLEY. *Arch. Environ. Health, 30(7):321-328, July 1975. 38 refs.*

Trends in daily cadmium intake in Sweden were investigated by analyzing 75 wheat samples harvested from the same non-polluted farms between 1916 and 1972 and a few barley samples harvested from the samme fields between 1964 and 1971. The individual scatter wass large, but a significant tendency toward increasing Cd concentration with time was evident for fall wheat in particular. A similar tendency was found for spring wheat, though it was not statistically significant. The increase appeared to be due to increased air pollution or the cumulative effect of fertilizers. There was a clear covariation in Cd concentrations for different genotypes of wheat and barley harvested in the same year despite yearly variations in average concentration. (Author abstract modified)

55414 **APTIC NO. 77059**

Kunishige, M. and Y. Hirata

COLLECTION AND PROPAGATION OF INDICATOR PLANTS FOR GASEOUS SULFUROUS ACID PART II. INTERSPECIES AND INTERVARIETAL DIFFERENCE OF SUSCEPTIBILITY TO SULFUR DIOXIDE IN ERICACAE, AND GENERA OF ACACIA AND OSMANTHUS. *(Aryusangas ni taisuru shihyo shokubutsu no shushu to hanshoku (II) Tsutsuji-ka, hiradotsutsuji, kurume tsutsuji, satsuki, acacia zoku oyobi mokuseizoku nado no kenjusei no shu, hinshukan sa). Text in Japanese. Dept. of Agriculture, Kurume City (Japan), Vegetables and Flowers Conf. Proc. Kurume City, Japan, 1975, p. 245. (March.)*

Eighteen species of Ericaceae, 11 varieties of Hirado azalea, 7 varieties of Rhododendron indicum and another species of Rhododendron (Kurume-azalea), 6 species of genus Acacia and 5 species of genus Osmanthus were exposed to sulfur dioxide at 3.0 ppm (1.0 ppm for genus Acacia) for 3-6 hr or longer (until the onset of injury) 1 to 3 times. Generally, the results coincided with those in their place of natural growth. The susceptibility among representative species of Rhododendron was highest in R. Kaempferi, the three-leaf azalea, and genus Enkianthus, and lower in evergreen Rhododendron with thicker leaves. Intervarietal differences in susceptibility was seen in R. indicum. As the shape and surfaces of leaves of the genus Acacia differ very much, and each species showed a different color of smoke spot and a different site of injury. In genus Osmathus, the onset times of injury differed greatly.

55415 **APTIC NO. 77060**

Kunishige, M. and Y. Hirata

COLLECTION AND PROPAGATION OF INDICATOR PLANTS FOR GASEOUS SULFUROUS ACID PART 5. EXPOSURE EXPERIMENT OF AUTUMNAL RED LEAVES. *(Aryusan gas ni taisuru shihyo shokobutsu no shushu to hanshoku 5. Koyo no sesshoku shiken). Text in Japanese. Dept. of Agriculture, Kurume City (Japan), Vegetables and Flowers Conf. Proc., Kurume City, Japan, 1975, p. 248, (March.)*

In order to determine that the seasonal changes in susceptibility of indicator plants to sulfur dioxide, one-year-old seedlings of Alnus firma (deciduous) with differently reddened leaves and three- year-old planted cuttings of Buxus microphylla (evergreen) with older, dark leaves and new leaves (grown after removing older leaves) were exposed to SO2 at 3 ppm for 19 hr (in 3 days) and 63 hr (in 10 days) in December 1974. In A.f. injuries began to appear on the apex and periphery of the leaves as greyish-brown smoky spots. The leaves subsequently wilted and dried. 1The ddifference in susceptibility depended on the degree of redness, un-reddened leaves being injured 53.8%, and slightly-reddened leaves being injured 50.0%. Reddened leaves were not injured. Injured leaves dropped off faster than reddened leaves. In B.m. clear white spots appeared on new leaves, and depressions appeared on the underside of reddened leaves. The leaves then turned white and dropped off. On ordinary green leaves no injury appeared. The property of Bm mentioned above was rare among evergreen trees.

EFFECTS-PLANTS AND LIVESTOCK

55416 **APTIC NO. 77063**

Kunishige, M. and Y. Hirata

EXPERIMENTAL RESULTS OF EXPOSING PLANTS WITH SPOTTED LEAVES. *(Aryusan gas ni taisuru shihyo shokubutsu no shushu to hanshoku (III) Fuiri shokobutsu no sesshoku shiken). Text in Japanese. Dept. of Agriculture, Kurume City (Japan), Vegetables and Flowers Conf. Proc., Kurume City, Japan, 1975, p. 246. (March.)*

The mechanism of leaf-damage due to sulfur oxides is closely related to the assimilation of carbonic acid gas. Plants with chimaera-type assimilation were tested for use as indicator plants for sulfur dioxide. The plants with such leaves belonging to species of morning glory, Japanese holly, Aucuba, Peperomia, Ficus elastica, camellia, and Hedera rhombea were fumigated with burning sulfur at 10 ppm for 30 min. Generally, the natural white spots did not discolor even at high concentrations of SOx. With the exception of F.e the green parts and lamellar chimaera parts of leaves of all trees showed smoky spots or total specific scorch. The leaves having clear boundary lines between green parts and white parts of natural spots showed smoky spots or scorch along the boundary line. Therefore, damage to green parts and the seemingly healthy parts of natural white spots could be used to differentiate SOx damage from other types.

55417 **APTIC NO. 77064**

Kunishige, M. and Y. Hirata

COLLECTION AND PROPAGATION OF INDICATOR PLANTS FOR GASEOUS SULFUROUS ACID PART 6. EXPOSURE EXPERIMENTS ON CUT BRANCHES. *(Aryusan gas ni taisuru shihyo shokubutsu no shushu to hanshoku 6. Kirieda go no nissu ni kansuru sessohoku shiken). Text in Japanese. Dept. of Agriculture, Kurume City (Japan), Vegetables and Flowers Conf. Proc., Kurume City, Japan, 1975, p. 249. (March.)*

In spite of several advantages of using cut branches as indicators for sulfur dioxide, assimilation decreases because of reduced susceptibility and reduced response to the pollutant. Therefore experiments were conducted with cut twigs of weak- resistant hypericum and Spiraea Thunbergii by exposing them (one, three, four, five, and six days after cutting) to SO2 at 2 ppm for 6 hr. Smoke spots appeared most rapidly in twigs cut one day prior to exposure. The longer the period after cutting and before exposure the slower the response.

55418 **APTIC NO. 77065**

Kunishige, M. and Y. Hirata

COLLECTION AND PROPAGATION OF INDICATOR PLANTS FOR GASEOUS SULFUROUS ACID PART 1. SUSCEPTIBILITY BY SPECIES TO SULFUR DIOXIDE. *(Aryusan gas ni taisuru shihyo shokubutsu no shushu to hanshoku (1) Shubetsu Kanjusei). Text in Japanese. Dept. of Agriculture, Kurume City (Japan), Vegetables and Flowers Conf. Proc., Kurume City Japan, 1975, p. 244. (March.)*

The susceptibility of 386 potted seedlings and cuttings of 163 species of plants was determined by exposing them to sulfur dioxide at 1.0 ppm for 3 hr at 30 C and 90% RH. Those which showed no injury were re-exposed to SO2 at 2.0 ppm for 5-20 hr at 30 C and 90% RH in July and August and at 25 C and 70% RH in September and October. Those which still showed no injury were exposed a third time to SO2 at 3.0 ppm at 15 C and 70% RH. Upon first exposure, clear and smoky spots appeared on the leaves of thirty species, especially herbs for flowers and deciduous trees. However, as hypericum is an evergreen it is useful as a year-round indicator plant. Intervarietal and interstrain differences in susceptibility were observed in azalea acacia, In fragrant olive, an interspecies difference was observed. There appeared to be a relationship between resistance to SO2 and the time required for smoky spots to appear after exposure with species specificity.

55419 **APTIC NO. 77066**

Kunishige, M. and Y. Hirata

COLLECTION AND PROPAGATION OF INDICATOR PLANTS FOR GASEOUS SULFUROUS ACID PART 4. RELATIONSHIP BETWEEN THE SUSCEPTIBILITY OF PLANTS TO SULFUR DIOXIDE AND THEIR GROWTH STATE, ESPECIALLY LEAF COLOR. *(Aryusan gas ni taisuru shihyo shokubutsu no shushu to hanshoku. (4) Seiikujotai, tokuni yoshoku to kanjusei to no kankei). Text in Japanese. Dept. of Agriculture Kurume City (Japan), Vegetables and Flowers Conf. Proc., Kurume City, Japan, 1975, p. 247. (March.)*

Each 6 potted plants of 8 species, Hydrangea scandens (a variety), Callicarpa japonica, Buxus microphylla, Rhododendron indicum (wild), R.i. (cultivated), R. erio carpum Kurume azalea, and R. mucronulatum var. ciliatum were divided into two equal groups. One group was well-fertilized and the other group was grown without any fertilization in order produce chlorosis. All the plants were then exposed to sulfur dioxide at 3 ppm for 18 hr in 4 days. There were no injuries in groups H.s., C.j. or R.e. The time required for wild R.i. Kurume azalea and R.m.c. to show smoky spots on their leaves was the same. However, the number of smoky spots was larger in the well-fertilized group and the initial appearance of smoky spots was more distinctive. Although there were no injuries in unfertilized B.m., conspicuous chlorosis appeared in well-fertilized B.m. The sulfur content of the leaves of H.s., B.m., and R.e. was greater in the well- fertilized groups. However, it was not clear whether the sulfur content depended on the amount of fertilizer or sulfur dioxide.

55420 **APTIC NO. 78994**

Linzon, S. N., B. L. Chai, P. J. Temple, R. G. Pearson, and M. L. Smith

LEAD CONTAMINATION OF URBAN SOILS AND VEGETATION BY EMISSIONS FROM SECONDARY LEAD INDUSTRIES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 14p., 1975. 10 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-18.2.)*

A lead contamination survey of urban soils and vegetation in the immediate vicinity of 45 secondary industrial sources of the metal was conducted in Ontario during 1972 and 1973. Lead levels in soil (0-5 cm depth) ranged as high as 21,200 ppm near a secondary lead smelter and as high as 17,300 ppm near a battery manufacturer. Tree foliage levels ranged as high as 3530 ppm, and grass lead levels were as high as 568 ppm. It is recommended that soils with a lead content of over 1000 ppm be removed from the immediate vicinity of urban secondary lead industries because of the possibility of lead re-entrainment into the air as well as the hazard posed to children in the area and the possibility of vegetable contamination.

55421 **APTIC NO. 77217**

Maeno, M.

STATUS QUO OF PLANT DAMAGE DUE TO PHOTOCHEMICAL SMOG. *(Kokagaku smog ni yoru shokubutsu higai no genjo). Text in Japanese. Kongetsu no Noyaku (Agric. Chem. Mon.), 19(9):51-53, Sept. 1975. 3 refs.*

The characteristic symptoms appearing on plants exposed to photochemical smog are described. According to 1973 and 1974 surveys in the Kanagawa Prefecture, photochemical smog damage 7 fruits, 11 leafy vegetables, 8 root vegetables, and another type of vegetable, out of 45 species investigated. Frequent occurrence of damage was observed in spinach, a salting green, Welsh onion, Beta vulgaris, a species of allium, Colocasia antiquorum, soybean, Phaseolous angularis, Phaseolus vulgaris, maize, sesame, and peanut. The period of occurrence was concentrated with 3 months on July. Because of their broad growing areas spinach, B.v., onion, C.a., Phaseorus, Chinese cabbage, Japanese radish, and P.v. would be effective plant indicator of photochemical smog. The extent of plant damage included the entire South Kanto region. The concept of oxidant-dose was explained, as well as the use of the oxidant-dose as an indicator of the susceptibility of various plants to photochemical oxidant.

55422 **APTIC NO. 79547**

Moyer, J. W. and S. H. Smith

OXIDANT INJURY REDUCTION ON TOBACCO INDUCED BY TOBACCO ETCH VIRUS INFECTION. *Environ. Pollut., 9(2):103-106, Sept. 1975. 8 refs. (Presented at the International Congress of Plant Pathology, 2nd, Minneapolis, Minn., Sept. 4-12, 1973.)*

The effect of tobacco etch virus (TEV) infection on oxidant injury in tobacco plants was investigated. Three commercially grown species and two experimental breedings were used at 10 and 12 wk after transplanting. Treatments consist of non-inoculated, non-inoculated plus ozone (0.25 ppm), inoculated, and inoculated plus O3. Tobacco etch virus-infected plants when exposed to O3 express less oxidant injury, fleck, and necrosis than similar non-inoculated plants. Twelve-week old plants are not protected from O3 damage as much as 10-week old plants. Similar flecking occurs on mature leaves of both inoculated and exposed uninoculated plants. Mosaic patterns characteristic of young leaves on infected plants are absent on uninoculated exposed plants. (Author abstract modified)

55423 **APTIC NO. 77130**

Nagy, Susana, G. Tartia, C. Muresan, and A. Iancut

LEAD IN SOME TYPES OF FOOD OF ANIMAL ORIGIN FROM A POLLUTED AREA. *(Plumbul in unele alimente de origine animala, provenite dintr-o zona poluata.). Text in Romanian. Igiena (Bucharest), 24(1):25-29, Jan.-March 1975. 11 refs.*

The lead content of food of animal origin, meat, eggs, and cheese, from an area polluted with inorganic lead of industrial origin was studied in comparison with control samples. The concentration of lead in food from the polluted area was higher than that found in the control samples and literature data. The concentrations of lead per kg of fresh product were 4.08 mg + or - 0.26 mg in pork, 3.96 mg + or - 0.58 mg in eggs and 3.37 mg + or - 2.94 mg in cheese. (Author abstract modified)

55424 **APTIC NO. 77049**

Nakajima, I.

AIR POLLUTION AND URBAN SHADE TREES. *(Taikiosen to toshi no ryokuhi). Text in Japanese. Sci. Am. (Jap. Ed.):p. 84-89, Sept. 1975.*

The recent destruction of plant-covered areas, especially in the Tokyo metropolitan area is discussed. The destruction of urban shade tree zones was due to urban development and to the construction of residential lots. The coverage ratio by green shade trees in Tokyo was reduced to 30%. When the ground surface of city is covered by concrete and asphalt, the radiant heat reflected from the surface rapidly increases. This results in keeping the temperature of the surface high enough to generate ascending air currents. Thus, polluted air flows into the city.

55425 **APTIC NO. 77225**

Nakajima, T., K. Terakado, A. Yanagida, and H. Fukuda

THE INFLUENCE OF AIR POLLUTION ON THE GROWTH AND YIELD OF RICE PLANTS. *(Taikiosen ga suito no seiiku, shuryo ni oyobosu eikyo). Text in Japanese. Nihon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), vol. 44 (Suppl. Issue):91-92, 1975. (Presented at the Crop Sciences Society of Japan, Annual Meeting, 159th, April 3-4, 1975.)*

Potted rice plants were grown in a glass house under each of the following conditions: clean air through all growth stages, clean air in the first stages, then polluted air, clean air in the first stages, and polluted air after the ear-issuing stage and polluted air throughout growth. A change in growth appeared just after transplantation, and strong repression of growth was seen under the last set of conditions. However, the growth in this plot later became vigorous. The number of highest stems was equal to or greater than that on plants grown in clean air. Plants grown in polluted air showed some dwarfing at harvest, with no decrease in the number of ears. The yield of grain was smallest the polluted plot due to a shortage of matured grains and insufficient ripening. The growth of plants exposed to clean air, then polluted air was between that of plants grown in completely clean air and that of plants grown in completely polluted air. The plants grown in polluted air only after the ear-issuing stage were not affected by the polluted air.

55426 **APTIC NO. 76983**

Nouchi, I., T. Iijima, T. Sawada, and T. Odaira

EFFECTS OF PEROXYACETYL NITRATE (PAN) OF PLANTS: SYMPTOMS OF INJURY ON HERBACEOUS PLANTS BY PAN. *(Shokubutsu ni oyobosu peroxyacetyl nitrate (PAN) no eikyo -PAN ni yoru sohon shokubutsu no higaijokyo). Text in Japanese. Tokyo-to Kogai Kenkyusho Nenpo (Annu. Rept., Tokyo Met. Res. Inst. Environ. Prot.), vol. 6:113-120, 1975. 26 refs.*

Thirteen species of herbaceous plants such as Beta vulgaris, spinach, Japanese radish, radish, French bean, lucern, tomato, peanut, petunia, lettuce, Welsh onion, morning glory and tobacco were exposed to synthetic peroxyacetyl nitrate (PAN) at 3-60 pphm for 3-8 hr/day, 1-3 days at 25 or 30 C under artificial illumination and 20 C in the dark. The PAN contained relatively large amounts of methyl and ethyl nitrate. Susceptible plants such as B.v., spinach, Japanese radish, French bean, lucern, tomato, petunia, lettuce, morning glory, and tobacco showed injuries at 10-15 pphm of PAN for 6-25 hr. The most susceptible, petunia, (white ensign) showed injuries at as low as 3 pphm. Injuries due to PAN, except for Japanese onion and peanut, were depressed spots on the undersides of the leaves at higher concentrations, appearing mainly on the younger leaves. The injuries occurred specifically in spongy tissue cells; resulting on cellular degradation and discoloration. Injuries appeared on the same plants grown in fields, at higher photochemical oxidant levels. Injuries due to ozone observed field were similar to those observed experimentally, suggesting that field injuries were due to PAN (except for spinach and Welsh onion). Injuries due to PAN were observed in thee morning glory.

55427 **APTIC NO. 77246**

Odaira, T.

INJURIES OF PHOTOCHEMICAL SMOG ON MORNING GLORY. *(Asagao ni ataeru kokagaku smog higai). Text in Japanese. Kurin Egi (Clean Age), no. 18: p. 7-18, June 1975. 6 refs.*

Well-known symptoms of plant damage due to several constituents of photochemical smog are described, and the results of a nationwide survey of damage to artificially grown morning glory (Scarlet O Hara) done in 1974 are presented. In 1974, there were alerts in over 22 Prefectures, mainly these on the Pacific ocean. However, there were only 28 alerts in July compared to 126 in July 1973. The regions where the index of injury (number of injured leaves versus total number of leaves in July) was larger than 21% were Kanto, Ise-bay coastal, Osaka-bay coastal, and Seto inland sea regions. The effects of oxidant on leaf cells and chloroplasts are described.

55428 **APTIC NO. 77185**

Pippen, E. L., A. L. Potter, V. G. Randall, K. C. Ng, F. W. Reuter, III, A. I. Morgan, Jr., and R. J. Oshima

EFFECT OF OZONE FUMIGATION ON CROP COMPOSITION. *J. Food Sci., 40(4):672-676, July-Aug. 1975. 12 refs. (Presented at the Institute of Food Technologists, Annual Meeting, 34th, New Orleans, La., May 12-15, 1974.)*

Cabbage, carrot, corn, lettuce, strawberry, and tomato plants were grown in clean air (carbon-filtered), clean air fumigated with 200 ppb of ozone, and clean air fumigated with 350 ppb of O3 to investigate the effect of the oxidant on crop nutrient composition. Ozone did not appear to exert a major and generally deleterious impact on crop composition, although there was a trend in reduced solids content of some crops. Some plants reacted to O3 by producing increased amounts of the reducing agent ascorbic acid. Cabbage exposed to O3, in contrast to all other crops, showed a significant increase in solids, and this trend also existed for all other components in cabbage that showed a significant difference. The quantity of metals in the crops was not influenced by O3 fumigation; whereas nonmetal nutrients showed at least one significant difference in 24 of 52 data sets, with some trends being evident. Corn was the most outstanding example of a plant showing trends in composition change following O3 exposure. Solids and carbohydrates decreased after O3 exposure, while nitrogen and vitamin C ran counter and increased.

55429 **APTIC NO. 79338**

Reinert, Richard A.

POLLUTANT INTERACTIONS AND THEIR EFFECTS ON PLANTS. *Environ. Pollut., 9(2):115-116, Sept. 1975. 2 refs. (Presented at the International Congress of Plant Pathology, 2nd, Minneapolis, Minn., Sept. 4-12, 1973, Session 12, Section 2, Paper 1.)*

Potentially serious changes occur in plants subjected to mixtures of air pollutants in experimental exposures and ambient air environments. A colloquium on pollutant interactions and their effects on plants was organized for the Second International Congress of Plant Pathology during the autumn of 1974. Three papers were presented at this session, concerning plant growth and development as influenced by combinations of sulfur dioxide and ozone, foliar injury response to combinations of SO2 and nitrogen dioxide, and the response of several plant species to the combination of SO2 and hydrogen fluoride.

55430 **APTIC NO. 79313**

Runeckles, V. C. and H. M. Resh

EFFECTS OF CYTOKININS ON RESPONSES OF BEAN LEAVES TO CHRONIC OZONE TREATMENT. *Atmos. Environ., 9(8):749-753, Aug. 1975. 12 refs.*

The effects of cytokinins on responses of bean leaves to chronic ozone treatment was investigated. Treatment of primary leaves of bush bean with 30 micrograms/cu cm N-6-benzyladenine or kinetin modifies the effects of daily exposure to 0.05 or 0. 0 microliters/l O3. Both cytokinins reduce the loss of chlorophyll caused by 0.10 microliters/l O3 and stimulate leaf growth, but neither prevent a decrease in stem and root weight caused by O3 treatment. Concentrations of 0.005 microliter/l O3 also result in increased leaf growth and decreased stem and root growth, without appreciably affecting leaf chlorophyll as determined by spectral reflectance measurements of the upper leaf surface. Cytokinins retard senescence and modify the O3 response of treated tissues, but apparently offer little protection to the growth of the rest of the plant against either O3 dosage. (Author abstract modified)

55431 **APTIC NO. 77259**

Shigetoshi, K.

EFFECTS ON AIR POLLUTION TO FRUIT TREE FIELD INJURY OF JAPANESE PEAR AS AFFECTED WITH THE INDUSTRIAL SMOG. *(Kaju no taikiosen ni yoru eikyo, kogyo-baien ni yoru nashi no higai). Text in Japanese. Bull. Tokyo Agric. Exp. Stn., no. 8:55-65, March 1975. 22 refs.*

The symptoms of industrial smog injury to pear leaves and fruit were investigated. Sulfur dioxide gas content in the air and sulfide content in the pear leaves were very high in orchards in polluted areas. Fruits which were affected by industrial smog at the flowering period became malformed. The surface of the peduncle and the fruit apex of bagged fruits were affected by acid solutions dissolved in rain water. Acid solutions (sulfuric H2SO4), hydrochloric (HCl), and nitric) sprayed as a mist onto pear leaves resulted in various symptoms depending on the concentration. Low concentrations (about 0.1 to 0.2N) of the acid solutions resulted in chlorosis and bleached necrotic areas on the leaf surface. Injury was equally apparent from either leaf surface of plants with undifferentiated mesophyll. Necrotic spots extending completely through the leaf developed on plants with either mesophyll structure at concentrations above 0.5N. Damage due to industrial smog was comparable to that resulting from solution concentrations of 0.2N to 1N. The upper epidermal cells of the pear leaf were broken down by H2SO4 solution, but not by HCl solution. It was assumed that damage in the field was caused by H2SO4 or sulfur dioxide. (Author abstract modified)

55432 **APTIC NO. 77038**

Shoda, M., S. Imaizumi, Y. Wada, and I. Suyama

THE EFFECT OF OXATHIIN COMPOUNDS ON REDUCING OXIDANT INJURY TO TOBACCO PLANTS. *(Oxathiin kagobutsu no tabacco no oxidant shogai ni taisuru bojo koka). Text in Japanese. Nihon Sakumotsu Gakkai Kiji (Proc. Crop. Sci. Soc. Japan), 44(2):178-184, 1975. 20 refs.*

Aqueous acetonic solutions of carboxin 50% WP (5,6-dihydro-2- methyl-1,4-oxathiin-3-carboxyanilide) and oxycarboxin 50% WP (5,6-dihydro-2-methyl-1,4-oxathiin-3-carboxyanilide-4,4-dioxide) were sprayed on the half-surface (upper and lower sides) of leaves of Bel-W3 tobacco plants grown in pots under controlled conditions in a glass house for 50-60 days with 20-25 leaves. The plants were removed to an ozone-exposure room 2 days after the spraying, left in the dark for 12 hr and exposed to ozone under illumination of 25 Klux and 25 pphm for 2 hr. The results showed that 1000 ppm of carboxin and 500 ppm of oxycarboxin repressed ozone-injury most effectively, 72 and 69% respectively. However, 1000 - 2000 ppm of carboxin produced chlorosis (yellow spots) on the younger leaves, and oxycarboxin did not produce phytotoxicity at any concentration. The repressive action of oxathiin appeared a few days after the spraying and continued for a few days after reaching the maximum. The same degree of effect was observed when only the lower surfaces of the leaves were sprayed. The effect of repressing ozone-injury without producing phytotoxicity on tobacco leaves by oxycarboxin was also demonstrated in field experiments. It was further confirmed that oxycarboxin produced no adverse effects on leaf maturity and the quality of tobacco leaves.

55433 **APTIC NO. 79508**

Siegel, S. M., B. Z. Siegel, N. Puerner, T. Speitel, and F. Thorarinsson

WATER AND SOIL BIOTIC RELATIONS IN MERCURY DISTRIBUTION. *Water, Air, Soil Pollut., 4(1):9-18, March 1975. 13 refs.*

Water and soil biotic relations involved in mercury distribution were studied in terms of the metal s availability in soil fractions and the relationship between Hg in plant samples and Hg in ambient soils or other supportive media. Plants were grouped by habitat into epipedic-epiphytic (mosses and lichens) and endopedic-aquatic-marine (Basidiomycetes and algae) samples; non-vascular and vascular forms were also distinguished. Sources include Alaska, Hawaii, New England, and Iceland. The average Hg contents were similar for all plant groups (126-199 ppb), with the exception of lichens which showed a low value of 84 ppb. No correlations between the Hg levels in lichens and the nature of the substratum were evident. Terrestrial plant forms showed plant substratum concentration ratios of 3.5 to 7.6, whereas the marine algae yielded a figure of 78.7. The modal ranges for the observed ratios were one- to two-fold for mosses and lichens, two- to 10-fold for Basidiomycetes and vascular plants, and greater than 10-fold for algae. In addition to a modal ratio in the range of 2-10 which was common to all of 275 vascular plant samples, a secondary mode in the range of 0-0.1 appeared in the Alaska-New England group which was over 500 km distant from active geothermal sites of Hg. Thus, evidence for both exclusion and concentration behavior was obtained. (Author abstract)

55434 **APTIC NO. 79309**

Suketa, Yasunobu and Takeo Yamamoto

EFFECT OF ATMOSPHERIC FLUORIDE ON PLANTS (BIOLOGICAL STUDIES ON ENVIRONMENTAL POLLUTION BY FLUORIDE PART I). *Text in Japanese. Nippon Nogeikagaku Kaishi (J. Agr. Chem. Soc. Japan), 49(7):341-346, 1975. 14 refs.*

The effects of atmospheric fluoride on gladiolus, mandarin, taro, Japan-cedar, and rice were investigated. The sensitivity of these plants against atmospheric fluoride is in decreasing order: taro, gladiolus, Japan-cedar, mandarin. The pool size of fluoride accumulation in plant leaves is in decreasing order: Japan-cedar, mandarin, gladiolus, taro. The calcium contents in the leaves of mandarin and gladiolus are 4.16% and 1.04% respectively. The ratio of calcium/silicon in the leaves of mandarin and gladiolus is 3.27 and 4.38 respectively. The contents of Ca and Si in the leaves of plants affect the sensitivity of plants to atmospheric fluoride. Accumulation of fluorine in unhulled rice is associated with fluorine content in the rice bran, but is not associated with that in the polished rice.

55435 **APTIC NO. 77221**

I. Takaoka, M. Fukada, T. Kisaki, H. Kitano, A. Koiwai, T. Shinohara, K. Niiba, T. Kitamura, and Y. Yamamoto

A PROTECTIVE AGENT FOR PLANTS FROM OXIDANT DAMAGE. *(Shokubutsu no oxidant shogai bojozai). Text in Japanese. (Japan Monopoly Bureau) Japan Pat. Sho 50-21949. 8p., July 26, 1975. (Claims not given).*

A protective agent for plants from oxidant damage, which contains a methylene dioxyphenyl compound such as sesamine, sesamorine, piperine, piperonyl butoxide, sesamex sulfoxide, n-propylisome, and saffloxane is described. The damage of plants, especially tobacco, by oxidants such as ozone is remarkably slight or absent when the plants are pre-treated with the agents.

55436 **APTIC NO. 77047**

Tanaka, K., T. Okada, and K. Hanami

THE EFFECTS OF SULFUR DIOXIDE ON THE OCCURRENCE OF PINE SOOTY LEAF MOLE DISEASE - EXPERIMENTS ON PLACING METHOD. *(Matsu no susuhagarebyo ni oyobosu SO2 no eikyo). Text in Japanese. Preprint, Japan Forestry Society, Tokyo (Japan), p. 290-292, 1975. 5 refs. (Presented at the Japan Forestry Society Annual Meeting, 86th, Kyushu, Japan, April 2-3, 1975.)*

Because it is known that pine sooty leaf mold disease by Rhizosphera kalkhoffii occurs always in industrial zones and around cities where ambient sulfur dioxide concentration is high, experimental studies were carried out by transplanting pine trees to places where air pollution was high or low to determine the effect of SO2 on the incidence of the disease. After growing 900 trees of Pinus densiflora in a place (B) where there was no air pollution, some of them were transplanted in a place (A) where sulfur dioxide levels were relatively high in June, August, and September 1972. All the trees were inoculated with conidia of R.k. The damage to trees place (A) was much more severe than to trees in place (B). Because of the concentrated occurrence of the disease during August and early September in place (A), the damage due to dryness was also severe. The concentration of SO2 in place (A) was highest in August (0.36 mg SO3/100 sq m/day) and lower in September (0.22 mg SO3/100 sq m/day). The fungus was not so virulent in normally grown pine trees and required a powerful inducement to occur vigorously.

55437 **APTIC NO. 77048**

Tanaka, K.

EFFECTS OF SULFUR DIOXIDE ON THE OCCURRENCE OF PINE TIMBER NEMATODE DISEASE. *(Matsu no zaisenchu byo no hassei ni oyobosu SO2 no eikyo). Text in Japanese. Preprint, Japan Forestry Society, Tokyo (Japan), p. 287-289, 1975. 4 refs. (Presented at the Japan Forestry Society Annual Meeting, 86th Kyushu, Japan, April 2-3, 1975.)*

Because of the possible relationship between air pollution and the pine timber nematode (Bursaphelenchus lignicolus) disease, a series of experiments was carried out in which 1000 and 10,000 B.l. and pseudo-pine timber nematodes were inoculated into seedlings of Pinus Thunbergii (5 ml per tree). The trees were exposed to sulfur dioxide at 0.2 ppm for one week before inoculation and for 10 weeks after inoculation. Withering of the exposed and inoculated trees with B.l. developed a week earlier than in controls. Withering of the trees exposed and inoculated with pseudo-pine timber nematode occurred earlier than in controls only when 10,000 nematode/ml were injected. Virulency of B.l. was far larger than that of pseudo-pine timber nematode. No resin abnormality exudation was observed on the trees exposed to SO2 with no inoculation. The trees inoculated with B.l. but not exposed to SO2 withered about 90%. Sulfur dioxide, although not the principal cause of withering, did act as an inducement.

55438 **APTIC NO. 77187**

Tanaka, K.

PLANT DAMAGE DUE TO AIR POLLUTION, PART 21. SYMPTOMS DUE TO INSECTS AND DISEASES, RESEMBLING THOSE DUE TO AIR POLLUTION. *(Taikiosen ni yoru shokubutsu higai Part 21. Byogichu ni yoru taikiosen ruiji shojo). Text in Japanese. Nogyo oyobi Engei (Agr. Hort.), 50(9); 1p., Sept. 1975.*

The distinction between plant damage due to air pollution and similar damage to plants by insects and diseases is discussed. One typical symptom is sooty leaf blight of new twigs of Pinus densiflora, caused by Rhizoshaera kalkhoffii which usually occurs near factories and urban areas. The damage is quite similar to that from sulfur dioxide. A second typical symptom was Marssomina leaf-fall disease caused by Marssonina brunnea on poplar trees. The distinguishing points between damage due to oxidant and that due to the disease are lesions on the veins, light yellow discoloration around the lesion, and white conidial clusters when atmospheric moisture is greater.

55439 **APTIC NO. 77216**

Taniyama, T. and I. Kawada

EFFECTS OF HEAVY METALS IN THE EXHAUST OF CEMENT FACTORY ON THE GROWTH OF RICE PLANT AND ON THE HARVEST. *(Cement kojo haien chu no jikinzoku nado ga ine no seiiku seisan ni oyobosu eikyo). Text in Japanese. Nihon Sakumotsu Gakkai Kiji (Proc. Crop Sci. Soc. Japan), vol. 44 (Suppl. Issue): 95-96, 1975. (Presented at the Crop Sciences Society of Japan Annual Meeting, 159th, April 3-4, 1975.)*

The growth of rice plants grown in flooded and dry fields were compared in soil polluted by exhaust from a cement factory and in clean soil. Changes in the time of the rice harvest around the factory was correlated to the production of cement. The growth of both varieties of rice plant was hindered in the polluted soil, and the dry weight of the plants was smaller than that of plants grown in unpolluted soil. The hindrance of growth was more severe in the variety grown in a dry field. Of the organs, growth of the roots was most hindered. As the production of cement increased, the growth of rice in the polluted field decreased.

EFFECTS-PLANTS AND LIVESTOCK

55440 **APTIC NO. 77220**

Taniyama, T., K. Yamashita, and T. Koike

STUDIES ON CROP DAMAGE DUE TO GASES, PART 22. ON THE DISTURBANCE OF PHOTOSYNTHESIS OF MAIZE, RICE, AND PEANUTS. *(Sakumotsu no gasu shogai ni kansuru kenkyu Dai 22-ho. Ozon ni yoru tomorokoshi, suito oyobi rakkasei no Kogosei sogai ni tsuite). Text in Japanese. Nihon Sakumotsu Gakkai Kiji (Proc. Crop. Sci. Soc. Japan)), vol. 44 (Suppl. Issue):93-94, 1975. (Presented at the Crop Sciences Society of Japan Annual Meeting, 159th, April 3-4, 1975.)*

The effect of ozone on photosynthesis in crops, as well as the existence of invisible disturbances and the irreversibility of the effects on photosynthesis as compared to the effects of sulfur dioxide is discussed. Under illumination of 53 Klux, at a leaf temperature of 30(+ or - 1)C, ozone inhibited the photosynthesis of maize, rice, and peanut even at 0.1 ppm, the actual oxidant level in polluted areas. The speed and degree of inhibition were, decreasing order, peanuts, rice, plant, and maize. The same tendency of susceptibility was visible in damage to the leaves. After removing ozone, the rice plants showed signs of restoration, maize did not show such signs, and in peanut plants damage developed. In the case of exposure to SO2 photosynthesis was restored in the peanut after 1 - 2 hr of gas exposure indicating the higher irreversibility of ozone damage. The effect of ozone increased with the intensity of light. Invisible damage due to ozone was slighter than that due to SO2 as observed in photosynthesis.

55441 **APTIC NO. 79367**

Tingey, David T. and Richard A. Reinert

THE EFFECT OF OZONE AND SULPHUR DIOXIDE SINGLY AND IN COMBINATION ON PLANT GROWTH. *Environ. Pollut., 9(2):117-125, Sept. 1975. (Presented at the International Congress of Plant Pathology, 2nd, Minneapolis, Minn., Sept. 4-12, 1973.)*

Plants were exposed to ozone and sulfur dioxide singly or in combination to examine the effects of gas mixtures on plant growth. Chronic exposures of tobacco (Nicotiana tabacum) to these mixtures result in growth reductions from the mix treatment equal to the additive effect of the single gases. Chronic exposures of alfalfa (Medicago sativus) result in growth reductions from the mixed treatment that are less than the additive effects of the single gases. Single acute exposures of radish (Raphanus sativus) to O3 and/or SO2 result in growth reductions in the mix treatment no different from the effects of the individual gases. None of the gas mixtures cause a greater growth reduction that is expected from the additive effects of the single gases. This is in contrast with foliar injury where gas mixtures frequently cause more foliar injury than the sum of the individual pollutants. (Author abstract modified)

55442 **APTIC NO. 77039**

Aichi Prefectural Office (Japan)

REPORT OF INVESTIGATION OF ENVIRONMENTAL ATMOSPHERE BY INDICATOR PLANTS, CHAPTER OF MATERIALS. *(Shihyo shokubutsu ni yoru kankyo taiki chosa kekka hokokusho). Text in Japanese. March 1975.*

The daily oxidant concentration (maximum dose between 9 am and 4 pm) in July and August obtained at 33 automatic monitoring stations in the Aichi Prefecture, the states of plant injuries which occurred during July and August in 41 middle schools (chlorosis and necrosis), and the relationship between injuries to morning glories and the daily oxidant dose in July and August are presented.

55443 **APTIC NO. 77050**

Kumamoto Prefectural Office (Japan)

FLUORINE CONTENT OF PLANTS. *(Shokubutsu-chu no fusso ganyuryo chosa). Text in Japanese. In: White Paper on Environmental Pollution in Kumamoto Prefecture in 1974:p. 32-33, 1975.*

According to 2-yr survey of the fluorine content of plants done in 1973 and 1974 in Arao City, where air pollution by fluoride from aluminum and phosphate-fertilizer factories exists, the content was larger in 1974 than in 1973, with the exception of rice plants. The values were as follows: 18.8 ppm in 1973 in grapes, 21.6 in Citrus unshu, 16.3 in pears, 18.6 in mulberry trees, and 16.6 in rice plants. In 1974, the figures were, respectively, 20.0, 33.1, 26.8, 22.5, and 12.1 ppm.

55444 **APTIC NO. 77223**

General Survey Group for Environmental Pollution in the Kashima Coastal Industrial Zone

ENVIRONMENTAL POLLUTION AS INDICATED BY VEGETATION. KASHIMA: DANGER OF ENVIRONMENTAL POLLUTION. *(Shokusei Kora Mita Osen. Kashima-shinobiyoru kogai). Text in Japanese. p. 39-42, May 1975.*

The results of a survey on the growth state of mosses and lichens, leaf damage of vegetables, and withering of roadside trees are discussed. The local distribution of moss indicated that the shorter the distance from the industrial complex the more kinds of moss could grow there. Damage to the leaves of Colocasia esculenta, peanut, and morning glory was seen everywhere in the neighboring areas. Withering was especially apparent on sweet oleander near a power station (39% were damaged), Pasania edulis near petrochemical factories (34%) and Zelkova next to a chemical factory (almost 100%).

1974

55445 **APTIC NO. 79065**

Bolter, Ernst

GEOCHEMICAL EFFECTS OF LEAD SMELTERS ON THE ENVIRONMENT. *National Science Foundation, Washington, D. C., Research Applied to National Needs, Trace Contam. Conf. Proc. 2nd Annu., Pacific Grove, Calif., 1974, p. 190-195. 2 refs. (Aug. 29-31.)*

NTIS: LBL-3217

Analyss of leaf litter and soil samples for lead, zinc, copper, and cadmium were performed in the vicinity of two lead smelters in southeast Missouri. Higher than background lead concentrations in leaf litter were observed at distances up to 25 mi from the smelters. The lead concentration of leaf litter collected at a distance of 0.3 mi from one of the smelters was as high as 7500 micrograms/g. Cadmium, copper, and zinc showed less extensive distribution patterns, with leaf litter concentrations being higher than background for up to 15 mi from the source. Less than 10% of the polluting heavy metals reached the underlying soil where they were retained in the top 1 in. of the soil layer. A significant fraction of the deposited heavy metal compounds appeared to be dissolved, probably by the action of organic acids, and removed in complexed form. (Author abstract modified)

55446 **APTIC NO. 79048**

Hemphill, Delbert D. and James O. Pierce

ACCUMULATION OF LEAD AND OTHER HEAVY METALS BY VEGETATION IN THE VICINITY OF LEAD SMELTERS AND MINES AND MILLS IN SOUTHEASTERN MISSOURI. *National Science Foundation, Washington, D. C., Research Applied to National Needs, Trace Contam. Conf. Proc., 2nd Annu., Pacific Grove, Calif., 1974, p. 325-332, 4 refs. (Aug. 29-31.)*

NTIS: LBL-3217

The accumulation of lead and other heavy metals in or on vegetation near lead smelters, mines, and mills in southeastern Missouri was investigated from 1971 to 1974. An area 12 by 25 mi in the New Lead Belt containing four mines and mills and one smelter as well as an area of 14 by 14 mi outside the New Lead Belt with a smelter at the center were sampled. Post oak (Quercus stellata) and shortleaf pine (Pinus echinata) foliage collected within 0.5 mi of a smelter accumulated maximum lead levels of 8125 ppm and 11,750 ppm, respectively. Elevated lead levels in white oak and blueberry leaves were detected at distances greater than 7 mi from the smelters and at distances of 4 mi from the mines and mills. Similar patterns of elevated levels of cadmium, copper, and zinc were found. Anomalous levels of zinc at certain sampling sites did not, however, appear to be correlated with the proximity of the site to the sources of emission in the area. (Author abstract modified)

55447 **APTIC NO. 79129**

Less, L. N., A. M. Arthur, and A. McGregor

FLUORINE UPTAKE BY GRASS FROM ALUMINUM SMELTER FUME. *Preprint, American Inst. of Mining Engineers, 21p., 1974. 8 refs. (Presented at the American Institute of Mining Engineers, Annual Meeting, Dallas, Tex., Feb. 1974.)*

Perennial ryegrass was grown in controlled atmospheres containing either hydrogen fluoride or submicron particulate fluorides to measure the quantity of fluorine absorbed by the grass under conditions and exposures similar to those occurring near aluminum smelters. The fluorine levels measured in the grass were 100 ppm/l microgram of fluorine as hydrogen fluoride/cu m of air and 1.2 ppm/l microgram of fluorine as fine particulate/cu m of air. These levels were observed for spring and summer conditions with sub-irrigation in the absence of rainfall. Traces (1-2%) of HF were also present in the particulate fluoride atmospheres and perhaps accounted for part or all of the absorption. The uptake of fluorine from submicron particulates thus appears to be less than 1% of that from equal concentrations of fluorine as HF.

55448 **APTIC NO. 77037**

Mizuno, A., H. Ono, T. Natsume, M. Nakayama, M. Ouchiyama, A. Otani, and E. Midorikawa

STUDIES ON THE INFLUENCE OF AIR POLLUTION AND ON GROWING TREES FOR GREEN WOOD. *(Taikiosen no jumoku ni oyobosu eikyo narabini ryokukaju ikusei ni kansuru kenkyu). Text in Japanese. In: Rept. of Aichi Prefect. For. Exp. Stn.: p. 29-72, Dec. 1974. 25 refs.*

The influence of air pollution from coastal industrial zone in the southern part of Nagoya on the forests and trees around the zone was investigated, and planting experiments were performed. The leaves absorbed the sulfur dioxide in air and accumulated sulfur. The broad range of distribution of the sulfur content of leaves was quite similar to the distribution of sulfur oxides in air, indicating that the sulfur content of the leaves could be used as an indicator of sulfur dioxide concentration. In highly polluted areas, damage to the leaf surface was seen, and the degree of damage could be ranked by species. The effect of air pollution on the growth of Pinus Thunbergii could not be observed due to other factors, such as soil environment.

55449 **APTIC NO. 77219**

Nakamura, H. and S. Matsunaka

UTILIZATION OF INDICATOR PLANTS IN AIR POLLUTION, PART 1. THE SUSCEPTIBILITY OF MORNING GLORY TO PHOTOCHEMICAL OXIDANT AND THE FACTORS OF ITS VARIATION. *(Taikiosen ni taisuru shihyo shokubutsu no riyo (1) Kogagaku oxidant ni taisuru asagao no kanjusei to sone hendo yoin). Text in Japanese. Nihon Sakumatsu Gakkai Kiji (Proc. Crop. Sci. Soc. Japan), 43(4):517-552, 1974. 6 refs.*

In order to test the morning glory as an indicator plant for photochemical oxidant, 10 varieties of Pharbitis nil and 2 varieties of Ipomoea tricolor were exposed to naturally occurring photochemical oxidant and to synthetic ozone. The factors affecting their susceptibility to such air pollution were examined. The most susceptible varieties were Heavenly Blue and Pearly Gate of I.t. and Scarlet O hara and Rose Queen of P.n. Their susceptibility was highest in the stage when the total number of leaves was 10 - 35, and low in the juvenile and senile stages. The most visible damage due to photochemical oxidant appeared on the 10th to 14th leaves from the top, that is, the matured leaves were very susceptible. The susceptibility was lower when fertilization and soil moisture were insufficient.

55450 **APTIC NO. 77213**

Nouchi, I.

EFFECTS OF OZONE ON NUCLEIC ACID AND PROTEIN IN THE LEAVES OF WOODDY PLANTS. *(Jumokuba no kakusan oyobi tanpakushitsu ni oyobosu ozon no eikyo). Text in Japanese. Zoen Zasshi (J. Jap. Inst. Landscape Archit.), 37(3):56-61, March 1974. 23 refs.*

In order to confirm the hypothesis that exposure of trees to ozone promotes senescence of their leaves, poplar trees, cherry trees, and Hibiscus syriacus were exposed to ozone at 15 pphm and 30 pphm for 12 hr (6 hr/day) and for 9 hr at 30 C during the day and at 20 C night and at 75% relative humidity with an average illumination intensity of 60,000 luxes. The leaves with petioles were collected and soaked in water to accelerate senescence. They were then analyzed for chlorophyll and nucleic acid content. Nucleic acids (RNA) and proteins in the leaves exposed to ozone were considerably reduced. Just after exposure, the RNA and protein amounts showed a temporal increase, and then decreased with the increase of exposure time, especially when visible symptoms of injury appeared. The amounts of RNA, protein, and chlorophyll in the leaves decreased slowly during senescence. However, the amounts in the exposed leaves decreased rapidly.

55451 **APTIC NO. 79080**

Toth, Jozef and Jaroslav Hanus

EFFECTS ON SOME AGRICULTURAL CROPS IN THE EMISSION AREA OF A CEMENT WORKS. *(Sledovanie ucinkov na niektorych polnohospodarskych plodinach v imisnom areali cementarne). Text in Slovak. Polnohospodarstvo, 20(4):287-295, 1974. 31 refs.*

Results are given, including yields and chemical and technical parameters of three crops, from observation trials near a cement works characterized by great dustiness. Solid alkaline aerosol particles from the cement works affected oats and potatoes in a negative manner. A decrease in soil fertility near a cement works is manifested first of all in acidophilous crops on light soils by slightly developed sorption complex and low soil buffering.

55452 **APTIC NO. 77228**

Sendai Municipal Office (Japan), Bureau of Public Health

THE INFLUENCE OF AIR POLLUTANTS ON PLANTS. *(Taikiosen busshitsu no shokubutsu ni taisuru eikyo). Text in Japanese. In: White Paper on Environmental Pollution 1974:p. 39-44, 1974.*

The influence of air pollutants (mainly sulfur dioxide) on Ginkgo biloba, Acer buergeriana, Liliodendron tulipifera, Firmiana platanifolia and Zelkova serrata along the main loads in Sendai City and in the suburbs was examined by determining the sulfur content of their leaves in May, August and October 1971. The sulfur content of G.b. was 1.6 - 2.0 times higher in August and October than in May, regardless of the locality. However, that in other species, except F.p., was 30% less in August and October than in May. That in F.p. in October was 1.3 times higher than in May and August. The sulfur content of G.b. in the center of the city was 1.8 times larger than that in the suburbs in May, while there was no difference in October. In Sendai City, conifers such as Cryptomeria japonica, Chamaecyparis obtusa, and Pinus densiflora, broadleaf trees such as Zelkova serrota, Prunus sp. and Acer sp. were selected as indicator plants. The results of an ecological study on lichens in Sendai City in June and September 1973 are discussed. The growth of lichens corresponded to the equiconcentration curve of SO2.

1973

55453 **APTIC NO. 77070**

Hemkes, O. J. and J. Hartmans

COPPER CONTENT IN GRASS AND SOIL UNDER COPPER HIGH-TENSION LINES. *(Kopergehalte in gras en grond onder koperen hoogspanningsleidingen). Text in Dutch. Tijdschr. Diergeneesk, 98(9):446-449, 1973.*

The copper contents of grass and soil in industrialized and non-industrialized areas were determined and related to the distance from high-tension copper electrical lines. Grass and soil in highly industrialized areas showed demonstrably higher copper levels than in less industrialized areas, presumably due to corrosion of the cables. The copper levels in grass directly underneath high-tension lines and at a distance of 100 m averaged 14.0 and 10.1 mg/kg, respectively, in industrialized areas and 11.6 and 9.5 mg/kg, respectively, in less industrialized areas. Similar values and trends were observed for soil copper levels. There appears to be a risk of sheep being poisoned by the copper at distances of 20 m from the cables.

55454 **APTIC NO. 79006**

McKeen, C. D., J. M. Fulton, and W. I. Findlay

FLECK AND ACIDOSIS OF POTATOES IN SOUTHWESTERN ONTARIO. *Can. Plant Dis. Surv., 53(3):150-152, Sept. 1973. 6 refs.*

The occurrence of a black necrotic flecking on the foliage of Irish Cobbler potatoes in southwestern Ontario during late June of 1966 and 1968 as well as the appearance of chlorotic leaves on similar plants during May of 1970 is reported. The potato fleck symptoms observed in 1966 and 1968 (interveinal speckles which enlarged rapidly to produce irregularly shaped black necrotic areas) appeared similar to the speckle leaf disorder attributed to air pollution. However, observations during 1970 of leaves that were interveinally chlorotic and purplish-red appeared to be due to high soil acidity. Potatoes grown in highly acid soil are susceptible to manganese toxicity.

55455 **APTIC NO. 76942**

Nishizawa, T.

AIR POLLUTION AND DISTURBANCE OF ARBOREAL GROWTH IN AN URBAN AREA. *(Toshi-iki ni okeru taiki osen to jumoku no seikku shogai). Text in Japanese. Hosei Daigaku Kikogaku Kenkyu (Hosei Univ. Climatol. Notes), no. 13:3-8, 1973. 11 refs.*

Utilizing the data on disturbances of arboreal growth in the Report of Investigation of Plants Damage Due to Air Pollution published by the Bureau of Capital City Development, Tokyo Metropolitan Office, the frequency of distribution of the indices of damage to color, shape, density, and leaf injury, the elongation and quantity of buds, and tree shape was calculated for 12 kinds of trees in the Tokyo metropolitan area. The sum of these indices from each kind of tree indicated that the damage increased with the height of the tree, and the distribution of the sum was almost the same as that of sulfur oxides in the air and of the distribution of sunshine.

55456 **APTIC NO. 79076**

Sanda, V., A. Ionescu, A. Popescu, and Elvira Grou

EFFECTS OF ATMOSPHERE POLLUTION ON PLANTS AROUND THE PITESTI CHEMICAL PLATFORM. *Rev. Roum. Biol. Ser. Bot., 18(5):341-346, 1973. 18 refs.*

Effects on plants by emissions from the Pitesti chemical works are described. The plant damage by atmospheric pollutants depends on several factors including concentration, nature, and quantity of emanations, wind direction, and precipitation. Effects are cumulative, especially in ligneous plants. The pollutants include carbon monoxide and ammonia from the carbon black factory, cyan-complex compounds, and hydrocarbons. Smoke dispersed into the atmosphere often forms, especially in the absence of air currents, a dense and persistent fog which hinders the penetration of solar rays, hampering photosynthesis. Fruits, vegetables, and cereals from the factory area contain large amounts of soot and substances deposited from factory smoke. Fodder and meadows are also affected. Considerable portions of leaves are burnt by pollutants, diminishing the plant's assimilating surface. Wheat, pea, and oat plants grown near the factory are poorly developed. Analyses performed on four plant species at varying distances from the pollution sources revealed that chlorophyll losses are discernible, even if foliar symptomatology is unclear. Two types of pollutants damage chlorophyll differently, making adaptation difficult. An average of 5% to 8% chlorophyll loss affects plant productivity up to 25%. Analyses were performed to determine the nitrogen content in peas and wheat, and the spectrum of free amino acids. The data clearly reflect a nitrogen accumulation by plants, a greater concentration being recorded at small distances from the pollution source. The free amino acid spectrum also confirms a much intensified metabolism in samples gathered from the relatively contaminated zone as compared with the control.

55457 **APTIC NO. 77106**

Schoenbeck, H. and H. van Haut

METHOD FOR AN AIR POLLUTION SURVEY USING INDICATOR PLANTS. *(Methoden zur Erstellung eines Wirkungskatasters fuer Luftverunreinigungen durch pflanzliche Indikatoren). Text in German. Verhandl. Ges. Oek (Saarbruecken), p. 435-445, 1973. 25 refs.*

A method for measuring air pollution by means of indicator plants is described, and results of such surveys in a highly polluted area in West Germany are presented. Plants, especially lichens, are good indicators of air pollution in phenomenological studies, and together with other higher plants, may be used in the determination of air pollutants from trace element levels. Parmelia physodes is a universal indicator of air pollution, due to the quantitative relationship between the mortality rate and the pollutant concentration to which it is exposed. The accumulation of trace elements, such as sulfur, fluorine, chlorine, lead, zinc, and cadmium was studied in Brassica oleracea acephala, Lolium multiflorum ssp. italicum, and Sambucus nigra. The cadmium levels in leaves of Sambucus nigra were shown above normal in 11% of all samples, while the zinc levels exceeded the background value in 58%, and the lead levels in 96% of all samples, indicating a high pollution level. The mortaility rates of Parmelia physodes were highest around industrial plants.

1972

55458 **APTIC NO. 76948**

Hoshino, T.

AGRICULTURAL HARVEST AND AIR POLLUTION. *(Nosakubutsu no shuryo to taikiosen). Text in Japanese. Taiki Osen Kenkyu (J. Japan. Soc. Air Pollution), 7(2):236, Nov. 1972.*

Investigation of the correlation between the concentration of sulfur dioxide and yield indices of rice, wheat, barley, sweet potato, and potato in Ube City as compared to the control (in Hofu City where air pollution is very slight), showed that, although the correlation was small, the yield of barley and wheat increased and that of sweet potato decreased. This tendency coincides with the resistance of both kind of crops to sulfur dioxide at relatively low concentration.

1969

55459 **APTIC NO. 76931**

Matsushima, Jiro

PROBLEMS IN SULFUR DIOXIDE GAS INJURY TO CITRUS TREES IN JAPAN. *Proc. Int. Citrus. Symp., 1st, 1969, p. 733-740. 14 refs.*

Sulfur dioxide injury to citrus trees in Japan is discussed. The correlation coefficient between the concentration of oxidized sulfur in the atmosphere and sulfur content of the leaves in July 1963 was very high, and it appeared that the higher sulfur content in the leaves came from sulfur dioxide in the atmosphere. Satsuma orange was resistant to sulfur dioxide, but after January the sensitivity rapidly declined. The gas concentration showed little relation to injury of Satsuma orange in the winter. Citrus was relatively insensitive to sulfur dioxide and did not develop visible symptoms at relatively high concentrations. The accumulated effects of a decrease in photosynthesis, an increase in respiration, quantitative and qualitative changes in organic components, excessive accumulation of sulfur, and the accompanying changes in the content of nutrient elements could cause invisible injury to citrus trees. Agricultural chemicals, especially Bordeaux mixture, reportedly promote leaf fall of citrus trees in sulfur dioxide contaminated areas. The influence of Bordeaux mixture and the possibility of using substitute chemicals for Bordeaux mixture are discussed. Copper ion by itself, markedly promoted respiration and reduced photosynthesis; it also depressed absorption of sulfur dioxide.

1936

55460 **APTIC NO. 79008**

Svoboda, Jaroslav

THE SO CALLED TESIN-DISEASE OF HIVE-BEES AND ITS TREATMENT. *(Tak zvana tesinska nemoc vcel a jeji leceni). Text in Czech. Sb. Cesk. Akad. Zemed., vol. 11:589-594, 1936.*

Studies investigating the cause of Tesin disease among honey bees and antidotes for its treatment are reported. Symptoms of the disease involve convulsive movements, loss of ability to fly, and eventual death. The dead bees are contorted, with their tongues protruding. Arsenic trioxide levels of from 0.0005-0.006 mg observed in a sample of 100 diseased bees suggest arsenic poisoning as the cause. Bees fed with sugar solutions of comparable levels of As_2O_3 show typical symptoms of the disease, confirming the chemical analysis results. Ferric hydrate is an effective antidote for the disease.

EFFECTS-MATERIALS

1975

55461 **APTIC NO. 79510**

Wieczorek, Grzegorz and Michal Wojtowicz

THE EFFECT OF THE CHEMICAL COMPOSITION OF FLY ASH ON THE CORROSIVENESS OF THIS MATERIAL ON IRON AND STEEL. *(Wplyw skladu chemicznego popiolow lotnych na agresywnosc korozyjna tych materjalow w odniesieniu do zelaza i stali). Text in Polish. Ochr. Korez., no. 5:145-150, May 1975. 3 refs.*

Two electrochemical measuring methods (Stern and Tafel) were used to evaluate the corrosive properties of ashes, and of cement grouts with the addition of ashes. Twelve ashes from an electrical power station and 17 mixtures, each of 2 ashes, at a proportion of 1:1, were examined. The ashes labeled A and B were mixed with cinderless cement at a ratio of 1:3, 1:1, and 3:1 to determine the influence of ash and cement mixture on the corrosion rate of steel. The differences in the composition of the ashes were considerable; they contained silicon dioxide (38.14 - 52.01%), ferric oxide (2.28 - 17.6%), calcium oxide (3.85 - 7.65%), and smaller quantities of magnesia, sulfuric acid anhydride, sodium oxide, potassium oxide, and sulfides. The sample of Armco iron was placed in a measuring vessel for 24 hr after water and ash were mixed in it. A very large surface area of the metal sample was in contact with the mixture during the measuring period. The corrosion rate increased if sodium sulfide (Na_2S) was added to the corrosive milieu (aqueous extract-ash). A relationship between chemical ash composition and corrosion rate of the Armco iron in the ash-aqueous extract environment was established. Those ashes which clearly deviated from a correlation between composition and corrosion current had an increased free CaO content compared to the other ashes, and had either raised or reduced SiO_2 content and high calcination losses.

1974

55462 **APTIC NO. 79535**

Masek, Vaclav and Vladimir Skarabella

EMISSION DURING WET QUENCHING OF COKE. *(Emise z mokreho haseni koksu). Text in Czech. Hutnicke Listy (Prague), 29(12): 843-849, Dec. 1974. 9 refs.*

The effects of emissions from wet quenching of coke on various materials were investigated. Samples were exposed to emissions for a period of up to 9888 hr at six places with a pressure quenching tower and a pressureless quenching tower, as well as at four places within the immediate vicinity of these towers. Materials tested included 17 different metals, 5 different metal platings, 3 protective ceramic coatings, 10 types of metal weldings and four different plastic materials. The corrosion of samples placed inside the pressureless quenching tower was significantly greater than that of samples exposed to emission from quenching under pressure. Although corrosion of samples placed outside of the towers was much less than corrosion of the samples inside a tower, it was nevertheless three to four times greater than that observed in the strongly polluted neighborhoods of some chemical plants. It was also established that the quantity of solid deposits has a strong effect on the rate of corrosion of the materials. Emissions from wet quenching of coke are strongly aggressive within the quenching towers but their intensity decreases approximately inversely with the square of the distance away from the tower (for a majority of metals). As a rule, the corrosion is greater at places outside of a tower which are protected from the wind.

EFFECTS-ECONOMIC

1975

55463 **APTIC NO. 78993**

Dole, Malcolm, Jr.

THE ECONOMICS OF THE DETERIORATION DILEMMA. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1975. 26 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-11.1.)*

A means of including social and economic costs of current air pollution control strategies in an explicit cost-benefit framework is suggested for quantifying information required for the setting of air quality standards and short-term goals in air quality management. The Delphi technique is recommended for extending the expert opinion methodology by which original air quality standards were set in order that a benefit function might be generated. The benefit function can then be compared with a function of the costs of control to set short-term goals. An application of this methodology to carbon monoxide is presented. (Author abstract modified)

55464 **APTIC NO. 79332**

Hamann, Rolf

DOES HEAVY FUEL OIL HAVE TO BE DESULFURIZED?. (Muss Schweres Heizoel entschwefelt werden)? Test in German. Umwelt, (3):55-58, June 1975.

General ecological and economic problems of the desulfurization of heavy fuel oil in West Germany are discussed in connection with a Federal Council proposal to reduce the sulfur content in heavy fuel oil gradually to 0.8% by 1985. The analysis of the technological advancement in this area shows that the desulfurization of distillate residues is technically feasible, but it is considerably more expansive than that of medium distillates. Cracking of the residues to lighter distillates presents itself as an optional solution. In view to the substantial economic impact of heavy fuel oil desulfurization, low-sulfur heavy fuel oil should be envisaged for use in special protection zones only rather than nationwide. Low-sulfur crude is expected from offshore drillings in the North Sea. The legislative measures concerning the use of desulfurized heavy fuel oil should be harmonized with similar steps taken in neighboring countries to prevent distortions in the competitiveness of the West German economy.

55465 **APTIC NO. 77019**

Moebius, Klaus

THE POLLUTION PROBLEM FROM AN ECONOMIC VIEWPOINT. *(Das Umweltproblem aus wirtschaftlicher Sicht). Text in German. Gummi Asbest Kunstst., 28(5):295-300, 1975. 48 refs.*

The economic effects of pollution produced by the manufacture of goods and the procurement of services are discussed. It is now necessary for any use of the environment to be included in economic considerations. With increasing use of natural resources and production of goods, pollution increases. There is a need for the restructuring of production as well as consumption.

55466 **APTIC NO. 79472**

Rieber, Michael

LOW SULFUR COAL. *J. Environ. Econ. Manage., 2(1):40-59, Sept. 1975. 17 refs.*

Several measurements of low sulfur coal resources are compared. Estimates depend on the definition used. Conventionally, the definition of low sulfur coal depends only on the weight of sulfur in a ton of coal, and not the heat content. Recalculation on a utility average Btu basis reduces U. S. estimates over 75% and Western estimates almost 85%. If washing is used to remove sulfur and some very optimistic assumptions are made, the overstatement of conventional estimates is only 33%. More probably, the overstatement is about 67%, even with washing. Production of low sulfur coal is analyzed and the relationship between coal prices and resource estimates developed. End use controls restrict the low sulfur coal available for electric utilities and industry in the short run. An embargo or quota on exports of low sulfur coal could provide about 55 to 60 million tons for the domestic market. Gasification, liquefication, solvent refining of coal, and stack gas scrubbing require the additional use of coal, but the requirement is least for scrubbing. All may be profitiable under current economic conditions. A 75% efficient scrubber could handle the average sulfur content (2.5%) of utility coals. Given the transportation costs of western coal to the Midwest, these alternatives based on indigenous midwestern high sulfur coal may be cheaper than western coal burned in the Midwest to meet air quality standards. (Author abstract modified)

55467 **APTIC NO. 79312**

Sievering, Herman

VISIBILITY, MASS CONCENTRATION AND POWER USE IN URBAN ENVIRONMENTS. *Atmos. Environ., 9(8):755-757, Aug. 1975. 6 refs.*

A simple statistical model is used to account for energy and economic costs incurred by additional artificial illumination in urban environments caused by pollutant aerosols. The prevailing visibility is used as a measure of diminished natural illuminations. As much as 1.0% of electrical energy is consumed due to this pollution factor. This is a minimum of $100 million annual cost to the residential home owner. Other air pollution costs include $4 billion as the annual cost from damage to crops, plants, trees, and materials. Estimates of health expenses and lost income due to disease range from $2 billion. (Author abstract modified)

55468 **APTIC NO. 79101**

Smith, Clifford B.

RELATIONSHIP OF ENVIRONMENTAL LAW AND REGULATIONS TO OUR ENERGY SUPPLIES. *Preprint, American Inst. of Chemical Engineers, New York, 15p., 1975. (Presented at the Complete Watereuse: Water's Interface with Energy, Air, Solids, National Conference, 2nd, Chicago, Ill., May 8, 1975.)*

Examples of increased energy requirements associated with regulations requiring the control of air and water pollutants are cited. Particulate removal via low velocity cyclones, high velocity cyclones, fabric filters, and venturi scrubbers is estimated to require additional power requirements of 0.59, 1.57, 1.77, and 2.95 horsepower/1000 cu ft/min, respectively. Odor control via incineration for a typical rendering of food processing operation is estimated to require an additional $1,000,000/yr for operating costs. The annual operating cost for removing odors by chemical scrubbing is substantially less, being $125,000/yr. Flue gas desulfurization (scrubbers) is estimated to cost an extra $80 to $150 per kilowatt of installed capacity and is expected to raise rates by as much as 33%. The energy penalty associated with the use of desulfurized oil is in the neighborhood of 1%.

55469 **APTIC NO. 79336**

Steiner, G. A.

POWER GENERATION AND ENVIRONMENTAL POLLUTION. *Energieerzeugung und Umweltbelastung). Text in German. Energie, 27(5):121, 1975.*

Highlights of the report on System Analysis Desulfurization Processes by the Ministry of Research and Technology of West Germany are presented. The ten bituminous coal power plants with 600 mWatts capacity each, as envisaged by the federal government in its recent energy program, will cause an additional sulfur dioxide emission of 4,650,000 tons annually. Flue gas desulfurization would require a capital investment of $167,000,000 and annual operating costs to the tune of $80,000,000. This measure would result in a 2.5% reduction in the SO2 emissions. The desulfurization of the distillation residues to 1% sulfur would require an investment of $1,000,000,000 to $1,700,000,000, and $500,000,000 to $670,000,000 annually as operating expenses. Thus, it would be possible to reduce the SO2 emissions to 40%. The new power plants should be distributed over the territory of West Germany rather than being centralized in Northrhine Westfalia. In this manner, it would also be possible to reduce the cost of electricity through increased integration of the power plants in remote heating systems.

55470 **APTIC NO. 79146**

Dept. of Commerce, Washington, D. C., Bureau of Domestic Commerce

FURTHER INFORMATION ON THE FLUOROCARBON INDUSTRY AND ON POTENTIAL ECONOMIC IMPACTS OF RESTRICTION OF FLUOROCARBON PRODUCTION. *13p., 1975.*

The economic impact of restricting fluorocarbon production and use is analyzed for three alternative restriction scenarios. All three scenarios adversely affect the fluorocarbon production industry and its users. The most severe restriction option is estimated to reduce the revenues from fluorocarbons and raw materials by more than 50%, with some reduction in employment also resulting. The major impact of fluorocarbon restriction on users is seen in the air conditioning and refrigeration industry. There are no practical substitutes for fluorocarbons in this industry, and most fluorocarbon

refrigerants cannot be used interchangeably in existing equipment.

1974

55471 **APTIC NO. 7[illegible]022**

Verleger, Philip K., Jr. and Dennis Sheehan

A STUDY OF THE DEMAND FOR GASOLINE (FINAL REPORT). *Data Resources, Inc., Lexington, Mass., Council on Environmental Quality and Environmental Protection Agency Contract EQC322, 156p., July 1974. 14 refs.*

NTIS: PB 235254

Calculated estimates of the effects of alternative levels of gasoline prices and incomes on the demand for gasoline during 1974 and 1975 are presented. Included in these calculations are specific evaluations of the direct and indirect effects of increases in the gasoline tax. The calculations are based on an econometric model of the demand for gasoline, and the projections are made using this model in conjunction with a macroeconometric model of the United States economy. The results of the analysis indicate price elasticities of -0.28, -0.07, and -0.14 over the long run, short run for the broadest aggregate of gasoline, and short run for the narrowest definition of gasoline consumption, respectively. Income elasticities are 1.0 and 0.35 for the long run and short run, respectively. The major economic effect of a 30 cents/gallon gasoline tax occurs in 1975, with real gross national product being 1.6% lower and unemployment being 0.5% higher. The adverse impacts are projected to disappear by the end of 1975.

1973

55472 **APTIC NO. 79131**

Provenzano, George

RISK-BENEFIT ANALYSIS AND THE ECONOMICS OF HEAVY METALS CONTROL. *Preprint, Illinois Univ., Urbana, Inst. for Environmental Studies, p. 339-346, 1973. 9 refs.*

The application of risk-benefit analysis to problems involving the economic impact of controls on heavy metals use is discussed. Estimated national consumptions for the years 1950, 1969, 1970, and 1971 are tabulated for arsenic, barium, beryllium, cadmium, chromium, copper, lead, manganese, mercury, molybdenum, nickel, selenium, vanadium, and zinc. Except for arsenic and vanadium each metal shows an annual rate of increase in consumption over the time period analyzed. The following parameters are required to estimate the public health risk associated with the use of heavy metals; the probability distributions for ambient concentrations at receptor points and the conditional probability distributions for damages to all receptor populations. Monitoring information can be used to construct the probability distributions for ambient concentrations. However, the conditional response probability is much more difficult to obtain; these distributions must be constructed from expensive and time-consuming epidemiological studies. Further problems involved in constructing this kind of conditional probability transformation arise because the pollutant may not exert the same effect on different target groups within the population. Additional research is required to perfect risk analysis.

55473 **APTIC NO. 79110**

Rabow, Gerald

COST OF POLLUTION. *IEEE (Inst. Elec. Electron Engrs.) Trans. Syst., Man, Cybern, no. 3:275-276, May 1973. 5 refs.*

A method for determining the cost of excess human mortality due to air pollution is presented. The scheme involves determining excess mortality due to air pollution, translating the excess mortality into a loss of lifetime, and putting a dollar value on loss of lifetime. Excess mortality is translated into per capita loss of expected lifetime by the following procedure: dividing the population into age intervals; determining the fraction of people belonging to each age interval, the life expectancy at that age, and the excess mortality at that age; and summing the product of excess mortality, life expectancy, and fraction of people per age group over all age groups. The result is a nondimensional ratio quantifying the loss of lifetime per unit time of exposure to air pollution. The method can be similarly applied to other losses in health or well-being due to air pollution, including aesthetic losses; however, an additional factor based on fractional incapacity or loss of well-being integrated over the time such loss exists due to air pollution must be included.

1972

55474 **APTIC NO. 79130**

THE ECONOMIC IMPACT OF POLLUTION CONTROL. A SUMMARY OF RECENT STUDIES. *Council of Environmental Quality, Environmental Protection Agency, and Dept. of Commerce Contract, 40p., 1972. GPO*

Summaries of studies conducted by various contractors for the Council on Environmental Quality and the Environmental Protection Agency involving the economic impacts of air and water pollution abatement requirements on various industrial activities are presented. A macroeconomic study involving Gross National Product, inflation, unemployment, interest rates, and balances of trade and payments was conducted along with 11 microeconomic studies of industries which might experience significant dislocations and impacts. The macroeconomic impact, although significant, does not appear to be severe. The rate of growth of the Gross National Product is expected to be retarded as a result of abatement activities. On a microeconomic scale, no particular industry is seriously threatened solely by the pollution abatement costs estimated. However, profits will decline for some firms in most of the industries studied.

1970

55475 **APTIC NO. 79216**

Jaksch, John A. and Herbert H. Stoevener

EFFECTS OF AIR POLLUTION ON RESIDENTIAL PROPERTY VALUES IN TOLEDO, OREGON. *Oregon State Univ., Corvallis, Agricultural Experiment Station, Rept. 304, 15p., Sept. 1970. 15 refs.*

The effects of changes in air quality on property values in Toledo, Oregon were estimated. Actual sales of residential property within the city limits of Toledo were studied. The study area was limited to single family residential housing. The only major source of pollution came from a pulp and paper plant. Information on dust fall, used as a measure of air pollution in the study area, was obtained from the Oregon State Sanitary Authority and from evidence submitted in a civil suit. Data on specific property characteristics were obtained from the Lincoln County Assessor. Two models were developed to explain property values. According to one model, a ton per sq mi per mo increase in particulate fallout would cause property values to decline by $277 per acre. According to the other model, a similar increase in particulate fallout would result in a decline in property values of $29 per market transaction. These models have general application in estimating the marginal social costs or benefits resulting from changes in air quality. Air pollution may exert significant influence upon property values. (Author abstract modified)

STANDARDS AND CRITERIA

1975

55476 **APTIC NO. 79541**

Morrow, P. E.

AN EVALUATION OF RECENT NOX TOXICITY DATA AND AN ATTEMPT TO DERIVE AN AMBIENT AIR STANDARD FOR NOX BY ESTABLISHED TOXICOLOGICAL PROCEDURES. *Environ. Res., 10(1):92-112, Aug. 1975. 85 refs.*

Recent nitrogen oxides toxicity data are evaluated and an ambient air standard for NOx is derived by established toxicological procedures. Toxicity data reported since 1966, involving eight experimental species, are considered in detail and presented in a tabular summary. Using these studies as a base, several NOx standards are derived for ambient air by estimating the maximal no-effect dose to be approximately 0.6 ppm nitrogen dioxide, and then applying toxicological principles espoused by leading international authorities for the formulation of environmental standards appropriate to general populations. The current ambient air quality standard of 0.05 ppm NOx is not conservative, but probably excessive. Risk benefit analysis is cited as an alternative procedure for setting NOx standards but the approach is untested and unsuitable for general populations. (Author abstract modified)

55477 **APTIC NO. 76995**

Quarles, John

HYDROCARBON AND CARBON MONOXIDE EMISSION STANDARDS, 1977. SUSPENSION. *Federal Register, 40(128):27964-27965, July 2, 1975.*

An expansion of the Environmental Protection Agency's suspension of the 1977 statutory hydrocarbon and carbon monoxide emission standards for automobiles to all manufacturers of light-duty vehicles is announced. The action is being taken in light of the fact that effective technology is currently not available for meeting the standards. Although the catalytic converter is capable of reducing such emissions to levels set by the 1977 standards, increases in sulfuric acid emissions associated with catalytic converters dictate against their use. The 1975 national interim standards of 1.5 g/mi hydrocarbons and 15 g/mi CO are to be applicable to all light duty vehicles distributed in commerce during the 1977 model year.

55478 **APTIC NO. 77083**

Walsh, George W. and Gary D. McCutchen

ECONOMIC AND ENVIRONMENTAL BENEFITS OF PERFORMANCE STANDARDS APPLIED TO NEW STATIONARY SOURCES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 17p., 1975. 5 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-29.6.)*

The concept of performance standards for new industrial emission sources is discussed. Such performance standards not only prevent new air pollution problems from occurring but also can be integrated into an emission control plan to achieve a targeted goal in a specified time. Depending on individual circumstances, this may or may not involve the control of existing plants. Federal New Source Performance Standards can be supplemented with state or local regulations to compensate for local variations in source categories and growth rates. The ultimate choice of a control strategy necessitates further cost-effectiveness analysis. (Author abstract modified)

1971

55479 **APTIC NO. 75923**

Lyarskiy, P. P., N. A. Pavloskaya, and Y. T. Kapitanov

STANDARDIZATION OF INSOLUBLE COMPOUNDS OF TH232 AND NATURAL THIORIUM IN FACTORY AIR. *(Normirovaniye nerastvorimykh soyedineniy Th232 i yestyestvennogo toriya v vozduke proizvodstvennykh pomescheniy). Gigiena i Sanit., no. 4:64-68, 1971 (?). 8 refs. Translated from Russian, 7p.*

Average annual permissible concentrations (APC) and maximum permissible concentrations (MPC) are calculated for insoluble compounds of thorium-232 and natural thorium in factory air by taking into account the metabolic properties of daughter radionuclides and their aerogenic entry together with Th-232. The calculated APC and MPC values for insoluble compounds of Th-232 with a mass median diameter of 1 micron correspond closely with the Standards of Radiation Safety in the USSR. The APC and MPI standards for insoluble compounds of natural thorium can be reduced by a factor of about 1.5. Since the toxicity of the insoluble thorium compounds depends on the mass median diameter of the particles in factory, APC and MPC standards must be indicated for various particle diameters.

LEGAL AND ADMINISTRATIVE

1975

55480 **APTIC NO. 77214**

Abe, M.

DEVELOPMENT AND PROBLEMS IN ENFORCEMENT OF LEAD-FREE GASOLINE PRODUCTION. *(Gasolin muenka jisshi no keika to mondaiten). Text in Japanese. Sekiyu to Sekiyu Kagaku (Petrol. Petrochem.), 19(1):48-51, Jan. 1975.*

A policy of producing lead-free gasoline was put into effect on February 1, 1975 by the petroleum industry, based on the creation of measures against lead-free gasoline by the Ministry of International Trade and Industry. After a specified period of time, lead-free gasoline will be provided at filling stations throughout the nation, while premium gasoline, which contains lead, will be supplied as before. A lead-free gasoline program has been investigated since 1970 by a minor committee for measures against air pollution by vehicles. On August 13, 1970, the committee proposed that lead-free gasoline should be provided on and after April 1, 1974 to prevent air pollution by lead and deterioration of waste gas clarifiers. The octane value of lead-free gasoline should be more than 88 and 95 for regular gasoline and high-octane one, respectively. With respect to vehicles already sold, experiments on the possibility of a valve seat recession, which may shorten the endurance of an engine, will be carried out in cooperation with petroleum and automobile industries. The lead content in gasoline used currently has been reduced by one-third since 1970. The total amount of lead used in 1970 (4341 tons) dropped to 3221 in 1971, and 2750 in 1972.

55481 **APTIC NO. 76987**

Babcock, Lyndon R., Jr., Niren L. Nagda, Edward J. Koval, and Robert J. Allen

LAND-USE ASPECTS OF AIR-QUALITY MANAGEMENT. *Sci. Total Environ., 4(1):63-77, May 1975. 24 refs.*

The relationship between land use and air quality is discussed. Topics covered include: guidelines for evaluating land use alternatives, the interpretation of air quality management techniques within a cost-benefit framework, the socioeconomic forces which shape cities, the use of energy variables to relate land use and environmental pollution with society s quest for affluence, problems with dispersion models and simulation techniques used for predicting pollutant dispersion, and the use of an urban simulation to integrate the foregoinng factors. Dispersion of a given population over a large area is shown to usually result in a reduced per capita pollution effect. The favorable effect diminishes as the area increases and as non-transportation sources are more effectively controlled. Far greater air quality benefits can be generated by limiting city size (both population and area) and then nucleating new population centers when necessary. (Author abstract modified)

55482 **APTIC NO. 79446**

Freeman, L. Russell

ARIZONA: APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. PUBLIC AVAILABILITY OF EMISSION DATA, PERMIT PROCEDURES, AND DEFINITION OF MAJOR SOURCES UNDER STATE JURISDICTION; STATE REGULATIONS. *Federal Register, 40(178):42368-42369, Sept. 12, 1975.*

Revisions to the Arizona State Implementation Plan are proposed. Amendments are proposed to the state regulations for recordkeeping and public availability of data to correct deficiencies. The definition of major sources under original state jurisdiction and authority is revised. Such major sources include facilities generating more than 75 tons of air contaminants per day, and as revised, would include all activities pertaining to the smelting of copper ore, and the refining of crude oil. Other proposed amendments clarify the statutory procedures relating to the filing and review of applications for installation permits, operating and conditional permits, and the specified permit fees.

55483 **APTIC NO. 79492**

Gladwin, Thomas N. and Michael G. Royston

AN ENVIRONMENTALLY-ORIENTED MODE OF INDUSTRIAL PROJECT PLANNING. *Environ. Conserv., 2(3)189-198, Autumn 1975. 42 refs.*

Many industrial projects are not being designed with the environment in mind. An environmentally oriented mode of planning, in which inputs and means related to environmental concerns are carefully taken into account during the planning, is discussed. Environmentally oriented planning requires that a new methodology, that of impact assessment, be fully integrated into the fabric of planning. Impact assessment consists of three analytical functions: description, prediction, and evaluation. These functions can be translated into a series of tasks, which in their entirety constitute the full process of impact assessment. The process can be achieved operationally by incorporating environmental considerations into planning via five dimensions: multidisciplinary professional involvement, broad public participation, holistic thinking, systematic analysis, and continuous integration. Adoption and application of the process can be encouraged by a number of internal organizational adjustments or by external public policy adjustments. (Author abstract modified)

55484 **APTIC NO. 77031**

Goto, Yahiko

PRESENT AND FUTURE STATUS OF PHOTOCHEMICAL SMOG COUNTERMEASURES. *(Kokagaku sumoggu taisaku no genjo to kongo). Text in Japanese. PPM Japan, 6(8):109-114, Aug. 1975.*

The present and future status of photochemical smog countermeasures in Japan are discussed. The yearly averages of oxidant concentrations, measured at two monitoring stations, one in Tokyo and the other in Osaka, from 1968 on, indicate that concentrations have remained fairly constant through the years, at about 0.03-0.04 ppm. Oxidant alerts have increased from a nationwide total of 7 (all in Tokyo) in 1970 to 288 in 1974. Since 1970, a total of 133,941 cases of health complaints related to photochemical smog have been reported. A drop in the number of complaints and alerts in 1974 was probably influenced by weather conditions in July 1974 (long wet season). Of the total number of health complaints from 1972 to 1974, 80% concerned students of middle schools (55%) and grammar schools (25%). In June 1972, an interministerial, interagency conference to promote photochemical smog countermeasures was established. By 1976 standards, automotive emissions of nitrogen oxides are 23% of preregulatory 1973 values. By 1975 standards, hydrocarbon emissions from automobiles have been reduced to 4% of pre-regulatory 1970 values. From 1972, a 3-year survey of the effects of photochemical smog has been conducted in the Tokyo Bay and Osaka Bay regions. Qualitative and quantitative data have been collected on the status of atmospheric pollution, mechanism and scale of movement of atmospheric pollutants, photochemical reactivity of smog-causing substances, and mechanisms of photochemical smog formation. Smog alert systems and prediction methods have been developed, and factories, enterprises, and citizens, have been asked to cooperate in reducing emissions of hydrocarbons and nitrogen oxides during the emergencies. The phenomenon of acidic rain needs further investigation. International cooperation in the matter of photochemical smog, spearheaded by Japan, has been formalized since 1972 through the OECD (Organization for Economic Cooperation and Development).

55485 **APTIC NO. 77082**

Hagg, Kenneth A. and Laurence A. Labrie

AIR QUALITY MAINTENANCE PLANNING IN MASSACHUSETTS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 21p., 1975. 9 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-29.7.)*

A model for simulating various combinations of emissions growth and control and the resulting impact on air quality was applied to the Metropolitan Boston Air Quality Control Region. Predicted annual average sulfur dioxide levels for 11 monitoring sites were correlated with measured levels, and concentrations were then predicted for alternative strategies for both the base year (1972) and 1985. The analysis indicated that sulfur-in-fuel regulations can be relaxed at the present time, although by 1985 the ambient standards are likely to be exceeded without a revision to the regulations. (Author abstract modified)

55486 **APTIC NO. 79000**

Hagg, Kenneth A., Thomas R. Parks, Frank H. Benesh, and Richard D. Siegel

MAINTENANCE PLANNING IN MASSACHUSETTS: USE OF LAND COVER FACTORS FOR APPORTIONMENT AND PROJECTION OF AREA SOURCE EMISSIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1975. 10 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-22.8.)*

A methodology for providing a spatially detailed inventory which correctly represents are a source strength is proposed in connection with the application of land use data to the Massachusetts plan for assuring statewide maintenance of air quality standards. A grid area source inventory is to be revised to account for varying intensities of land use. The employment and population density of each grid is estimated from the employment and population density of the municipalities in the grid. A factor to be applied to the grid s fuel inventory is going to be developed from the grid s calculated density and the population or employment density of the area. The grid area source inventory is also going to be revised to account for the relative presence of point sources in a grid.

55487 **APTIC NO. 79173**

Heller, Stephen R.

A CHEMICAL INFORMATION SYSTEM. *In: OR and D ADP Working Proceedings No. 1, Environmental Protec-*

tion Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 234-235, Jan. 1975. 2 refs. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)

NTIS: PB 241 150

Current and potential utilization of the National Institutes of Health Chemical Information System by the Environmental Protection Agency is discussed. Currently, the Agency s use of the CIS is limited to two programs. However, one component of the CIS which shows enormous potential use by the Agency is the chemical substructure search. Substructure search allows the scientist to query the file for data involving mass spectra infrared information, pesticide registration information, and toxic substance information. The question is specified by a chemical structure, and the answers are the data whose structures contain the specified substructure. The Management Information Data Systems Division of EPA is currently making a pilot version of the SSS option operational for testing and evaluating mass spectral and pesticides files. The SSS and Chemical Abstracts registry data will allow the Agency to take specific parts of the CIS relevant to the Agency s needs, build up individual data bases, and finally link them together.

55488 **APTIC NO. 77076**

High, M. Dean, Charles N. Ehler, and Terrence A. LiPuma

SOCIOECONOMIC ANALYSES OF AIR QUALITY MAINTENANCE STRATEGIES. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 16p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-29.8.)*

The Residuals Environmental Quality Management (REQM) method and its application to the Baltimore air quality maintenance plan are described. The method encourages the systematic examination of the generation of residual materials, methods for their prevention, and quantification of resulting socio-economic effects. The REQM assumes that control measures may be applied at each step in the generation of each residual for each source category. The application of the method to the design of alternative particulate control strategies for the Baltimore Air Quality Control Region resulted in the selection of a strategy consisting of land use planning and measures to control fugitive dust and to reduce energy consumption. The strategy tends to minimize social and economic impacts by the very nature of the selection process.

55489 **APTIC NO. 77029**

Hirao, Osamu and Soichi Ishihara

ON THE FRINGES OF EXHAUST GAS REGULATIONS AND AUTOMOTIVE TECHNOLOGY. *(Haigasu kisel to jidosha gigutsu no shuben). Text in Japanese. Gijutsu To Ningen (Tech. Hum. Being), 4(7):85-93, July 1975.*

Before petroleum disappears from the earth, its price will become so high that other energy sources will be found. Muskie pollution control regulations are valid under laboratory conditions, but useless for actual driving conditions, because precision attainable under laboratory conditions is not met in everyday situations. Automobile design should start from considerations of size, driving characteristics, fuel consumption, and end with the proper engine size (cc). Autotricycles, developed during 1950-1955, failed, because emphasis shifted from utility to ridability, and these vehicles became an interior variation of the automobile, instead of retaining their unique identity and utility. Public conception of pollution is often a matter of feeling, rather than logic. The report of the 7 Cities Commission is criticized. Pollutant standards should be established at impossibly high values, and automakers should be in free competition to reach these standards. Those automakers getting closest to the standards should be rewarded. Ultimately, more research is necessary.

55490 **APTIC NO. 77285**

Holmes, John G., Joel L. Horowitz, and Steven G. Kuhrtz

EVALUATING UNCERTAINTIES ASSOCIATED WITH AIR QUALITY PROJECTIONS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 10p., 1975. 7 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-22.3.)*

A description of two methods for evaluating the impact of input variable uncertainties on projected air quality concentrations is presented. A statistical differential technique is the basis of one method, while a Monte Carlo sampling procedure is used in the other. The usefulness of both methods depends on the accuracy of the distributions used to represent the uncertainties in the input variables. The Monte Carlo technique possesses the advantage of giving a good indication of the probability of achieving the air quality standard and of the mean and higher order moments of projected air quality. An example involving the achievement of the photochemical oxidants air quality standard for the year 1977 in a hypothetical air quality control region is provided. A Fortran program is used to generate a distribution of projected 1977 oxidant concentrations.

55491 **APTIC NO. 77036**

Horibe, Masao

AIR POLLUTION CONTROL IN MANCHESTER, ENGLAND. *(Igirisu, Manchesuta no taiki osen taisaku). Text in Japanese. Kogai Kenkyu (Stud. Public Nuisance), 5(1):60-68, July 1975. 9 refs.*

The history and status of, and countermeasures to air pollution in Manchester, England, are summarized. Since the beginnings of the industrial revolution, pollution has caused problems in Manchester. The Manchester Police Act of 1844 regulated burning and smoke emission. In 1946 smokeless zones were established within the city. Smoke control areas were established in 1956. Also in 1956, government regulations provided a 70% subsidy for conversion of furnaces in private dwellings. A series of 7 Smoke Control Orders, enacted in 1971, regulated on area covering about 2 sq mi, and containing 5219 buildings (4095 residences; 1124 non-residences). Open-air incineration of wastes has been a major problem in Manchester. However, in 1971, the maximum fine imposed included $122.00 in penalty and $12.00 in costs for one case. Six violations had been prosecuted successfully. Dark smoke regulations have been in effect since 1958, but of two violations, only one case resulted in fines ($12.00 in penalty; $7.00 in costs). In smoke control areas, only solid smokeless fuels must be sold, under penalty of law. However, this policy has become a social problem, in that old-age pensioners often break the law and buy coal, because of lower cost. Regional enforcement of air pollution regulations is under the jurisdiction of the District Alkali and Clean Air Inspector.

55492 **APTIC NO. 79346**

Hoshizawa, K.

AUTOMOBILE CONTROL AT KAMIKOCHI. *(Kamikoshi ni okeru jidosha riyo tekiseika ni tsuite). Text in Japanese. Kokuritsu Koen (Natl. Parks), no. 308:18-19, July 1975.*

The automobile traffic control regulations for national parks were issued in March 1974. Private automobiles crowding national parks caused a great deal of damage to the natural environment and caused problems of pollution and traffic safety. The contents of the 1975 Automobile Traffic Control Regulation issued in June 1975 for Kamikochi National Park are as follows: private automobiles are prohibited in the park from July 26 to Aug. 23, 1975 except designated cars, cars with permission, and buses and taxis at certain hours. The parking regulations and prohibition of driving in off-road areas are strictly enforced.

55493 **APTIC NO. 79175**

Johnson, Maureen

RTCC SOFTWARE AND ACCESSIBILITY. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 265-270, Jan. 1975. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)*

NTIS: PB 241 150

Data processing software available at the Environmental Protection Agency s Research Triangle Park facility is described. The software which is designed for a UNIVAC 1110 system includes scientific, statistical, and data management packages as well as many compiler languages. The software falls into three general categories: UNIVAC supplied and supported, packages obtained from private vendors or other government agencies, and packages converted from an IBM/360 system to the UNIVAC 1110 system. Specific elements within each of these general categories are described.

55494 **APTIC NO. 79375**

Kuniyoshi, T.

AGAINST THE CONSTRUCTION OF BLAST FURNACE. *(Manmosu koro wa gomenda). Text in Japanese. Gijutsu to Ningen (Tech. Hum. Being), 4(9):57-64, Sept. 1975.*

Contents to the suit filed by citizens of Chiba city in May 1975 against Kawasaki Steel Co. protesting the construction of new blast furnace No. 6 and demanding compliance with the environmental standards and compensation for pollution victims are discussed. The movement of citizen s toward the filing of this suit is described chronologically. Concentrations of sulfur oxides and nitrogen oxides in Chiba are ranked among the highest in Japan. The status of air pollution, pollutant emissions from Kawasaki Steel, and pollution effects on residents are summarized. Problems of pollution control measures concerning the construction blast furnace No. 6 and related facilities as seen by Kawasaki Steel, are discussed, pointing out the deceptiveness of simulation tests. Actions taken by Kawasaki Steel since the filing of the suit are also discussed.

55495 **APTIC NO. 79171**

Lackey, Curtis S.

HARVARD GRAPHICS PACKAGES. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 132-147, Jan. 1975. 7 refs. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 974.)*

NTIS: PB 241 150

Computer graphics packages available at Harvard University s Laboratory for Computer Graphics and Spatial Analysis are described along with specific applications of the packages to air pollution studies. A computer program for the production of maps and diagrams which graphically depict spatially disposed quantitative and qualitative information is illustrated in terms of its application to studies of carbon monoxide motor vehicle emissions in the Puget Sound region. Another program written for the purpose of generating three dimensional line-drawing displays of data is applied to the St. Louis Interstate Air Pollution Study Area. Illustrations of 2-hour sulfur dioxide levels in oblique view are provided. Various other graphics programs with a diversity of applications are also described.

55496 **APTIC NO. 78998**

Midler, Joseph L. and Owen P. Hall, Jr.

CRITICAL UNCERTAINTIES IN VEHICLE EMISSION EXHAUST CONTROL PROGRAMS. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 18p., 1975. 20 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-11.4.)*

An analysis of uncertainties associated with the performance of various vehicle exhaust emission control programs is presented. Programs considered include: various inspection/maintenance procedures, retrofit systems, fuel modification schemes, and inspection/maintenance-retrofit combinations. Extremely significant uncertainties are found for all of the emission control programs examined. The uncertainties manifest themselves at three different levels: specification of the model, key functional relations, and numerical values of specific critical parameters. The use of the cost/effectiveness ratio which is commonly employed to evaluate specific emission control programs can be a misleading indicator of whether a program should be adopted in a specific region. Mathematical optimization techniques are recommended for finding minimum cost programs which are subject to effectiveness and possible other constraints. Inspection/maintenance and retrofit are not necessarily substitutes in many regional air pollution cases; rather, they are complementary in the sense that both must be applied to meet stringent ambient air quality standards. Uncertainties associated with a pure retrofit program are commensurate with those of inspection/maintenance due to small experimental sample size, highly variable cost factors, deterioration rates, and public acceptance. Minimal potential benefits arise from selected fuel modification alternatives due to existing controls and highly uncertain cost factors. (Author conclusions modified)

55497 **APTIC NO. 77007**

Montgomery, Robert E., Jr.

ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT. NOTICE OF INTENTION TO ISSUE CONSTRUCTION ORDERS TO CERTAIN POWERPLANTS IN THE EARLY PLANNING PROCESS. *Federal Register, 40(114): 25090-25093, June 12, 1975.*

Notice of the Federal Energy Administration s intention to issue construction orders to certain power plants pursuant to the authorities granted it by section 2 of the Energy Supply and Environmental Coordination Act of 1974 and in accordance with 10 CFR Parts 303 and 307 is given. The proposed orders require the designated power plants in the early planning process to be designed and constructed such that they are capable of using coal as their primary energy source. Public comment on the proposals to issue construction orders is invited in the form of written presentations of data, views, and arguments.

55498 **APTIC NO. 79415**

Murakami, H., H. Sawada, and H. Hatta

THE AIR POLLUTION MONITORING SYSTEM. *(Taiki osen kanshi sisutem). Text in Japanese. Nihon Denki Giho (Tech. Rept. NEC), no. 2: 25-39, March 1975. 1 ref.*

The air pollution monitoring system which was installed by NEC is reviewed. As part of the air pollution control system, the main function of the monitoring system is the collection and analysis of local data on pollution and meteorological conditions from the observation stations. Colleection of all data is carried out by telemetry at a central station. Observation covers the concentration of sulfur oxides, nitrogen oxides, carbon monoxide, oxidants, hydrogen carbonate, and wind direction, wind velocity, temperature, humidity, and intensity of ultraviolet light. Analysis is by computer.

55499 **APTIC NO. 79482**

Naito, Masaaki

AN INTERPRETATION OF TOTAL EMISSION REGULATION AND CARRYING CAPACITY OF THE ENVIRONMENT. *(Soryo kisei to kankyo yoryo ni kansuru shisutemu teki kosatsu). Text in Japanese. Kogai To Taisaku (J. Pollution Control), 11(6):663-671, 1975. 11 refs.*

Concepts of total emission regulation and environemntal carrying capacity are examined with respect to air pollution (sulfur oxides), for purposes of setting up simulation models. Questions which arise in the establishment of total emission regulations include the definition of regional areas which are to be covered by the regulations, and determination of policies for implementation of the regulations. Both spatial scales and time scales must be included in considerations of pollution presence. Quite often, administrative areas do not coincide with areas affected by the phenomena of pollution. Assignment of allowable limits of pollution to various pollution sources becomes complicated, because of the multiplicity of factors involved (physical, chemical, biological, topographical, meteorological). Plume models offer the best all-purpose simulation.

55500 **APTIC NO. 77084**

Norco, Jay E., Roger K. Raufer, and Phillip A. Roberts

THE AIR QUALITY AND ENERGY IMPLICATIONS OF SUPPLEMENTARY CONTROL SYSTEM IMPLEMENTATION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1975. 11 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-29.5.)*

The implementation of supplementary control systems as an interim measure for attaining air quality standards in the near term until sufficient stack gas scrubbing devices are available for sulfur dioxide control is discussed with particular reference to the electrical power production industry in Illinois. A supplementary control system is a program that incorporates real-time monitoring of stack emissions, meteorological conditions, and air quality with a numerical scheme for determining current and future ambient air quality in the vicinity of a specific source. Thus, when selected levels of ambient air quality are obtained or forecasted, specific emission reduction activities can be undertaken. The use of supplementary control systems for the primary power plant condidates would account for approximately one-fourth of the 1975 Illinois coal production and half of the coal which remains in the state. Without the supplementary controls, this quantity of coal would be displaced by low-sulfur western coals, resulting in a severe economic impact on the Illinois coal industry. Furthermore, the added cost to the utilities would approachh $80 million/yr. (Author abstract modified)

55501 **APTIC NO. 79416**

Ozawa, K., M. Matsushita, and S. Ogura

THE AIR POLLUTION SOURCE MONITORING SYSTEM. *(Taiki osen hasseigen monitaringu sisutem). Text in Japanese. Nihon Denki Giho (Tech. Rept. NEC), no. 2:40-51, March 1975.*

The air pollution source monitoring system which was installed by NEC is reviewed. Factories which emit exhaust stack gases are under obligation to have an observation station to detect fuel flow rate, fuel oil sulfur content, temperature, stack gas flow rate, and concentration of sulfur oxides and nitrogen oxides in the stack. These data must be taken every 10 or 15 minutes and sent to the central monitoring station. Data analysis is by a minicomputer (NEAC-M4/n). Communication between the source monitoring and central control station is by use of 400 MHz band ultra high frequency or a line of Japan Telephone and Telegram.

55502 **APTIC NO. 79534**

Pospisil, Zbynek

HYGIENE OF THE INDUSTRIAL WORKING ENVIRONMENT. *(Hygiena pracovniho prostredi v prumyslu). Text in Czech. Stavivo, 53(1):20-24, Jan. 1975. 16 refs.*

A review is presented of laws and regulations governing the protection of personnel in the building materials manufacturing industry against dust, sound, and vibration. Atmospheric dust is measured by gravimetric methods and chimney dust by isokinetic methods, according to CSN 12 4010 procedures. The allowable dust levels must satisfy CSN 12 7040 and are controlled by CTIO of STIO agencies. Methods for the measurement of sound pressure generated by equipment, as well as ambient sound, are specified by CSN 01 1603 which also specifies the processing and presentation of data. Equipment-generated noise is measured 1 m away from the source and ambient sound is measured 0.25 m away from the head of a worker. Sound meters with standard A, B, C filters and spectrum analyzers are used. Safe sound levels are based on international ISO specifications. Vibration is measured mostly by piezoelectric accelerometers in combination with sound meters in the range of frequencies from 1 Hz to 1000 Hz. Allowable levels are determined from specifications similar to those governing sound levels.

55503 **APTIC NO. 79441**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. MISSISSIPPI: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(178): 42354-42357, Sept. 12, 1975.*

No comments were received from the general public or from the affected sources on the proposed revisions to the compliance schedule portion of Mississippi s plan for the attainment and maintenance of the national ambient air quality standards. Each schedule establishes a date by which an individual air pollution source must attain compliance with the emission limitations of the State Implementation Plan. The proposed revisions were approved.

55504 **APTIC NO. 79442**

Quarles, John

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. GEORGIA: APPROVAL OF COMPLIANCE SCHEDULES. *Federal Register, 40(178):42351-42353, Sept. 12, 1975.*

Several proposed compliance schedules submitted by Georgia were approved. Each establishes a date by which an individual air pollution source must attain compliance with an emission limitation of the State implementation plan for the attainment and maintenance of the national ambient air quality standards. The Georgia Air Quality Control Section pointed out that four schedules for sources in Augusta had been heard but not issued. These schedules were not approved at this time.

55505 **APTIC NO. 77288**

Raufer, Roger K.

THE TECHNOLOGY ASSESSMENT ACT AND AIR POLLUTION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 13p., 1975. 17 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-22.1.)*

The Technology Assessment Act of 1972 is described along with likely effects of the act on the field of air pollution and the development of a technology assessment process. The act is designed to provide Congress with information on the social, environmental, and economic impact of technical applications. The Office of Technology Assessment, also established by Congress, is within and responsible to the legislation branch of the government. Although the OTA has initiated work on less than a dozen technology assessments to data and none thus far have directly addressed air pollution problems, air pollution is a factor in several of the assessments (e.g., rapid transit studies). Potential air pollution problems which might become the subject of OTA study include proposed amendments to the Clean Air Act, problems such as the land use implications of the Clean Air Act, and the status of flue gas desulfurization processes.

55506 **APTIC NO. 79443**

Ravan, Jack E.

FLORIDA: APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. PROPOSAL OF PLAN REVISIONS. *Federal Register, 40(178):42369, Sept. 12, 1975.*

Two revisions to Florida s implementation plan submitted on February 12, 1975, are described. The first specifies the bases upon which the state will determine Latest Resonably Available Control Technology. The second revision involves the addition of a fourth category to revisions specifically provided for in the Florida plan s section on plan revisions.

55507 **APTIC NO. 77100**

Rhoads, Richard G.

THE NATIONWIDE PROGRAM FOR MAINTENANCE OF AIR QUALITY. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 8p., 1975. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-06.3.)*

The initial state implementation plans concentrated on attainment of the ambient air quality standards in the relatively polluted areas of the country. Many of these plans must now be modified to ensure that the ambient standards will be maintained for the foreseeable future, and to ensure that significant deterioration of air quality in clean areas of the country is prevented. The existing implementation plans currently contain many measures which are applicable to the maintenance and deterioration efforts, but additional measures must also be developed. Many of these additional measures will involve future planning activities -- most common of which will be land use planning activities. After existing sources have reduced their emissions to the lowest practical level, further air pollution control can only be accomplished by implementing rational planning procedures for management of any new sources of air pollution. This will require extensive cooperation among the air pollution control community; regional, state, and local planning agencies; state and local governments; and the general public in order to ensure that future land use plans include appropriate air quality considerations. (Author abstract)

55508 **APTIC NO. 79174**

Rogers, T. L.

INTRODUCTION OT THE UNIVAC 1110 AT RESEARCH TRIANGLE PARK - CAPABILITIES. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 257-264, Jan. 1975. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)*

NTIS: PB 241 150

The components and general capabilities of the UNIVAC 1110 computer system installed at the Environmental Protection Agency s Research Triangle Computing Center are described. The UNIVAC 1110 system is a general purpose, high performance system incorporating the latest advances in computer design, system organization, and programming technology. The various components of the system are designed as separate logical units providing maximum functional modularity. The multiprocessing capabilities are an integral part of the system. The command/arithmetic units, for example, can perform numerous tasks simultaneously under control of a common executive. The flexible modular structure enables a user to tailor a system to his individual requirements. Principle features of the UNIVAC 1110 system include: common resource systems organization; multiple command/arithmetic units and input/output access units; character manipulating instructions; partial-word, double-word, and full-word addressability; system partitioning capability; redundancy among system components; two levels of directly addressable storage; large modular plated-wire primary storage; large modular core extended storage; storage protection; program address relocation; independent input/output access units; extensive software library and language processors; dynamic adjustment to a mix of batch, demand, and real-time modes; a wide choice of high performance peripheral subsystems; and independent, simultaneous communications processing.

55509 **APTIC NO. 79025**

Roy, Louis-Philippe

ENVIRONMENTAL STUDY FOR SITE SELECTION FOR A GAS TURBINE POWER PLANT. *(Etude d environnement conduisant au choix d un site pour une centrale de turbines-a-gaz). Text in French. (Presented at the Colloq Quebec Sec. Assoc. Air Pollut. Prevent., St-Jovite, Quebec, Canada, May 26, 1975.)*

The application of the Delphi method for site selection of a gas turbine power plant in Canada is described. The panel charged to assess different sites was composed of biologists, ecologists, chemists and physicists. Noise, air quality, current and future land use, ecology, regional economic impact, aesthetic and historical aspects, transportation, and geophysical and hydrological conditions were the criteria used for the assessment. These selection criteria, rated by points, ranged from 5 for geophysical and hydrological aspects to 16 for air quality and land use. This method permitted site selection with a minimum amount of subjectivity, as the ratings were done individually by the experts in the panel.

55510 **APTIC NO. 77098**

Rubin, Edward S. and Harold T. Bloom

MAINTENANCE OF AMBIENT PARTICULATE STANDARDS IN AN INDUSTRIALIZED REGION. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 1975. 16 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-06.1.)*

Modeling studies and air quality data analysis are applied to the region of Allegheny County, Pennsylvania to assess the adequacy of existing regulatory policy for attaining secondary air quality standards in the next decade, during which time little regional growth is expected. Under compliance with existing emission regulations, currently inventoried sources are projected to contribute about one third of the annual future impacts of fugitive emissions, especially from industrial process operations, and of background concentrations advected into the region. Present estimates of the latter impact indicate values of about 45 to 50 micrograms/cu m, which are about 50% higher than values heretofor assumed for Allegheny County. It also appears that attainment of short-term standards may impose the more stringent control requirements, though definitive assessments of control needs are hampered by inadequacies in modeling techniques, source inventories, and ambient monitoring data. Efforts to upgrade these areas in the context of intensive local studies are seen as the most immediate need for meaningful air quality maintenance projections in industrialized regions such as Pittsburgh. (Author abstract)

55511 **APTIC NO. 77097**

Sableski, J. J., T. M. Donaldson, and Martin Massoglia

CASE STUDIES IN AIR QUALITY MAINTENANCE PLAN DEVELOPMENT. *Preprint, Air Pollution Control Assoc., Pittsburgh, Pa., 22p., 1975. 4 refs. (Presented at the Air Pollution Control Association, Annual Meeting, 68th, Boston, Mass., June 15-20, 1975, Paper 75-06.2.)*

Baltimore, Denver, St. Louis, and San Diego were chosen for the development of sample Air Quality Maintenance Plans (AQMP). In Baltimore, Denver, and San Diego, appropriate regional, state, and county authorities already existed; but innerstate committees had to be set up in St. Louis. New data on air pollution had to be collected in some cases. Disparities

between local, state, and national growth predictions occurred in all four cities; local predictions were generally used. Emission reductions to attain the primary ambient air quality standards were frequently found to be over 50% of base year emissions. Strategies vary, but all included some degree of land use constraint.

55512 **APTIC NO. 79167**

Scotton, John W.

CONCEPTS VERIFICATION TESTING OF THE ENVIR SYSTEM. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 63-68, Jan. 1975. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)*

NTIS: PB 241 150

An evaluation of the Environmental Protection Agency s Environmental Information Retrieval (ENVIR) system was conducted to establish the applicability of the system to the collation, sorting, correlative analysis, and interpretation of the selected categories of EPA data. A successful demonstration/evaluation of the ENVIR system led to the recommendation of an in-depth systems analysis and its application to the Environment Dependent Management, Process Automation and Simulation (EDMPAS) system. An information management system was developed such that, in conjunction with a user agency, a systems design can be jointly determined for immediate application to Agency management needs. (Author conclusions modified)

55513 **APTIC NO. 77146**

Skibin, D.

SITING OF INDUSTRIAL ZONES NEAR CITIES. *Atmos. Environ., 9(5):543-547, May 1975. 18 refs.*

A theoretical approach to industrial siting near cities which is intended for initial land use planning, evaluation of existing conditions, and policy determinations is presented. Meteorological factors dictate the best choice during the initial phase of planning the site for an industry near a city. The concept of weighted rose is presented and used along with other criteria to determine the best geometrical shape and sector for siting the industry, and the method is applied to the city of Beer-Sheva. After the application of the wind rose concept, the various (weighted) source heights, real shape of the city, population distribution, and even topography can then be incorporated to give a rating of the surrounding areas. Factors such as land availability and cost, distance from railways, rivers, lakes, main roads, resources, and markets, as well as other considerations can finally be added to modify thee picture and give optimal siting. The existence of a nearby city can modify the picture and is treated similarly. (Author summary modified)

55514 **APTIC NO. 77135**

Strelow, Roger and Roger Sant

VOLUNTARY FUEL ECONOMY LABELING: PROGRAM FOR 1976 MODEL AUTOMOBILES. *Federal Register, 40(120):26058-26060, June 20, 1975.*

Participating manufacturers will place a label on each automobile giving fuel economy information. Specific labels, for a given combination of engine configuration, inertia weight, transmission type, and axle ratio, are recommended; but general labels for a larger group of vehicles are permitted. Information given on the labels will be collected in the Gas Mileage Guide for New Car Buyers. Fuel economy information is based on analyses of exhaust gas derived from dynamometer tests. City and highway driving are simulated by separate dynamometer schedules.

55515 **APTIC NO. 77119**

Takahashi, Isao

A LEGAL CASE AGAINST KAWASAKI STEEL CORP. IN CHIBA PREFECTURE: COUNTERMOVEMENT AGAINST BLAST FURNACE CONSTRUCTION AND THE RIGHT OF INHABITANTS. *(Chiba, kawatetsu kogai sosho no kadai: koro kensetsu sashidome seikyu to jumin no kenri). Text in Japanese. Keizai (Econ.), no. 137:53-62, Sept. 1975.*

Forty seven certified pollution afflicted patients and 157 citizens in Chiba filed a suit against the Kawatesu Chiba Steel Mill in May 1975. The contents of the suit are the suspension of construction of the sixth blast furnace (presently under construction) and related facilities, strict enforcement of emission standards and environmental standards for sulfur dioxide, nitrogen dioxide, and suspended particulates, and payment of $1.54 million as reparation for injury. The public reaction to the suit and actions taken by the steel company are discussed. A descroption of the production scale and operational management system of the Chiba Steel Mill are given. The present status of air pollution in the surrounding area and its effect on human health are discussed. The 1973 data indicated that the SO2 concentration in this area was extremely high, 0.142-0.207 ppm (one day average); the NO2 concentration was also high, 0.089 ppm (one day average); and falling particulates were higher than 20 tons/mo. The necessity for the suspension of blast furnace construction, resident s rights, andd the citizens movement against pollution are also discussed.

55516 **APTIC NO. 76936**

Train, Russell E.

WASHINGTON. PROPOSED REVISION TO IMPLEMENTATION PLAN, TRANSPORTATION CONTROL STRATEGIES: TRANSIT IMPROVEMENTS. *Federal Register, 40(114):25029-25030, June 12, 1975.*

The Environmental Protection Agency Administrator proposes to amend section 52.2493 of the Washington implementation plan to revise the final compliance date for the establishment of exclusive bus lanes from January 1, 1975 to January 31, 1976 and to concurrently revise appropriate interim compliance dates. The proposed extension is based on Seattle s need for additional time to satisfy requirements to secure Federal funding for the project and to extensively involve the community in project development.

55517 **APTIC NO. 77008**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. PROMULGATION OF FINAL AMENDMENTS TO TRANSPORTATION CONTROL PLAN - BOSTON, MASSACHUSETTS. *Federal Register, 40(114):25151-25170, June 12, 1975.*

Final amendments to the transportation control plan regulations of the implementation plan for the Boston Intrastate Air Quality Control Region are promulgated by the Environmental Protection Agency Administrator. Included in the amendments is a revised regulation which prescribes mandatory measures to reduce single- passenger commuter vehicle use to be implemented by employers and educational institutions. This program is to be implemented in conjunction with the carpool matching program now being developed by the Commonwealth of Massachusetts and the employee pass program offered by the Massachusetts Bay Transportation Authority. In addition, EPA is promulgating new programs for controlling carbon monoxide levels at certain locations outside the Boston core area, a new procedure for periodic air quality monitoring to be used in updating the plan, and a requirement for a detailed study leading towards comprehensive measures for encouraging bicycle use.

55518 **APTIC NO. 79439**

Train, Russell E.

APPROVAL AND PROMULGATION OF IMPLEMENTATION PLANS. ALABAMA: APPROVAL OF PLAN REVISIONS. *Federal Register, 40(168): 39503-39505, Aug. 28, 1975.*

Comments on a proposed revision in the Alabama implementation plan are discussed. The revision would add specific regulations for the control of particulate emissions from coke ovens. The original process weight regulations applicable to coke ovens were difficult to enforce because there was no easy or accurate way to measure or even to estimate actual emissions. The proposed regulations were approved except for the section on pushing. No action was taken on this section because of the uncertainty as to the degree of control needed. The regulations require the installation of the best available retrofit technology for all coking operations except pushing.

55519 **APTIC NO. 79168**

Williams, Edward R.

SEAS - THE STRATEGIC ENVIRONMENTAL ASSESSMENT SYSTEM. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 69-87, Jan. 1975. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)*

NTIS: PB 241 150

The computerized Strategic Environmental Assessment System designed for tracing the impacts of policy actions in economic, energy, and environmental areas is described. The system provides for national forecasts over periods of from 10-20 yr as well as for forecasts disaggregated to regions such as states. A particular module in the system provides a set of environmental residuals associated with industry. The first purpose of this module is to determine the gross residuals that are produced by the economic process. Next, it associates those environmental abatement processes with the gross residuals to modify the levels and forms of pollutants that are released to the carrier media. A macroforecast of land use acreage based on the industrial production levels is also included as one of the modules in the system. The SEAS is written in FORTRAN IV and resides on private disc packs. Air pollutants considered by the computerized forecasting system include total suspended particulates, sulfur oxides, nitrogen oxides, carbon monoxide, hydrocarbons, pesticides, radioactive materials, lead, and mercury.

55520 **APTIC NO. 79176**

Worley, Donald L.

TECHNICAL AND ENVIRONMENTAL INFORMATION SYSTEM. *In: OR and D ADP Working Proceedings No. 1, Environmental Protection Agency, Washington, D. C., Office of Research and Development, Rept. 600/9-75-002, p. 271-281, Jan. 1975. (Presented at the Office of Research and Development Automatic Data Processing Workshop, Bethany, W. Va., Oct. 2-4, 1974.)*

NTIS: PB 241 150

The Technical and Environmental Information System (TENIS) which was designed to fulfill the information storage and retrieval needs of the Environmental Protection Agency s Air Pollution Technical Information Center is described. Design goals and benefits of the system include: the support of activities which APTC currently performs on a regular batch processing basis, expansion potential to provide capabilities which are desirable but not a necessity at the present time, and the use of a high- order programming language (COBOL) which is an industry standard and understandable by the user. The TENIS system includes the following elements: provision for new document input, a dictionary which serves as vocabulary control file and also as an indexer for entering the search file, a table of contents, a text file, a search file which includes all the descriptors necessary for searching, a secondary search file includes additional descriptors that do not require a vocabulary check, a search input section, a document list which serves as a temporary file in the text retrieval process, a report tape, selected documents which have been searched and retrieved according to pre-entered criteria, an edit and file update system, a search system comprising two COBOL programs which provide the Boolean logic necessary to effect the descriptor search of the data files, and a subsystem consisting of a report program and a text retrieval system.

55521 **APTIC NO. 79304**

Yamate, Shigeru, Nobuko Iijima, and Kuniaki Takagi

DAMAGE TO LIFE-STYLE BY POLLUTION: RESEARCH SURVEY ON STATE OF POLLUTION DAMAGES IN URBAN HOUSEHOLDS. *(Kogai ni yoru seikatsu higai: Toshi kazoku no kogai higai jokyo ni kansuru chosa kenkyu). Text in Japanese. Preprint, Executive Committee for Symposium of Environmental Sciences, Tokyo, p. 310-311, 1975. (Presented at the Executive Committee for Symposium of Environmental Sciences, 1st Research Presentation Meeting, Tokyo, Japan, June 6-8, 1975.)*

A survey was conducted among some 250 housewives living in two pollution-plagued sections of Tokyo, Japan, in March 1974, to determine how pollution had affected their lives. Questionnaires were distributed, interviews were conducted with the subjects of the survey, and case reports were compiled. Discrepancies between subjective and objective views of pollution were checked. One section under study was a semi-industrial area, where a truck route, highway, residences, and industry are mixed together, with compounded problems of air pollution, noise and vibration, and malodor. The other section had rather quiet residential areas, but part faces on two heavily traveled highways and part has a concentration of apartments in a low-lying, damp area.. The principal kinds of pollution are noise, vibrations, automobile exhaust gases, and photochemical smog. The survey disclosed that over 70% of the subjects were aware of the effects of air pollution, and over 25% were conscious of damage due to interference with sunshine, and jamming of radio waves. However, the subjects were not always aware of pollution effects, and a listing of specific pollution effects in the questionnaires produced better results than unstructured question and answer listings.

55522 **APTIC NO. 75461**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. NEW JERSEY-NEW YORK-CONNECTICUT AQCR 43. *Office of Air and Waste Management Contract, 39p., Jan. 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 14 thermal power plants located in the New Jersey-New York-Conneticut Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the 59th Street, Indian Point, Hell Gate, East River, Hudson Avenue, Glenwood, Northport, Essex, Hudson, Kearny A, Kearny B, Linden, Marion, and Sewaren plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard. The emissions from all of these plants, except the Indian Point plant, also result in contributions to ambient air concentrations which by themselves do not exceed the primary annual SO2 standard. The values for the ratio of the ambient SO2 concentration to the emission rate for a given plant, in micrograms/cu m per g/sec, range from 0.041-1.4 and 0.30-1.6 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0027-0.067 for the maximum annual concentration. These values indicate the relative pollution potential of the plants.

55523 **APTIC NO. 75466**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. WEST CENTRAL FLORIDA AQCR 52. *Office of Air and Waste Management Contract 28p., Jan. 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from eight thermal power plants located in the West Central Florida Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum load operation at the Inglis, Bartow, Bayboro, Higgins, Lake Parker Number 3, Hookers Point, and Big Bed plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard; whereas emissions from the Gannon plant under both nominal and maximum load conditions do result in the 24-hour standard being exceeded. The primary annual SO2 standard is not exceeded as a result of emissions from any of the plants. The values for the ratio of the ambient SO2 concentration to the emission rate for a given plant, in micrograms/cu m per g/sec, range from 0.058-1.71 and 0.034-1.45 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0031-0.14 for the maximum annual concentration. These values indicate the relative pollution potential of the plants.

55524 **APTIC NO. 75467**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. BURLINGTON-KEOKUK AQCR 65. *Office of Air and Waste Management Contract, 23p., Feb. 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Keystone thermal power plant located in the Burlington-Keokuk Air Quality Control Region (Illinois and Iowa) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 2.2 and 1.2 for nominal and maximum loads, respectively, on maximum concentration days and 0.21 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

55525 **APTIC NO. 75468**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. EVANSVILLE-OWENSBORO-HENDERSON AQCR 77. *Office of Air and Waste Management Contract, 25p., March 1975. 5 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Ohio River and Warrick thermal power plants located in the Evansville-Owensboro-Henderson Air Quality Control Region (Indiana and Kentucky) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from each of the plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.054 (Warrick) to 0.43 (Ohio River) and from 0.054 (Warrick) to 0.32 (Ohio River) for nominal and maximum loads, respectively, on maximum concentration days and from 0.0029 (Warrick) to 0.065 (Ohio River) for the maximum annual concentration. These values indicate the relative pollution potential of each plant.

55526 **APTIC NO. 75469**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN CINCINNATI AQCR 79. *Office of Air and Waste Management Contract, 23p, March 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the West End thermal power plant located in the Metropolitan Cincinnati Air Quality Control Region (Indiana, Kentucky, and Ohio) are presented as part of an effort to determine the air quality impact of changes in fuel use andd possible compliance schedule extensions. Emissions under both nominal and maximum load from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/ cu m per g/sec, are 1.8 and 0.83 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant.

55527 **APTIC NO. 75470**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. DOWN EAST AQCR 109. *Office of Air and Waste Management Contract, 23p., Feb. 1975. 2 refs.*

Diffusion modeling analyses of sulfur dixoide emissions from the Graham thermal power plant located in the Down East Air Quality Control Region (Maine) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 2.3 and 1.8 for nominal and maximum loads, respectivvely, on maximum concentration days. These values indicate the relative pollution potential of the plant.

55528 **APTIC NO. 75476**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SOUTH CENTRAL MICHIGAN AQCR 125. *Office of Air and Waste Management Contract, 24p., Feb. 1975. 4 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Morrow thermal power plant located in the South Central Michigan Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 0.22 and 0.11 for nominal and maximum loads, respectively, on maximum concentration days and 0.020 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

55529 **APTIC NO. 75477**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CON-

CENTRATIONS. MINNEAPOLIS-ST. PAUL AQCR 131. Office of Air and Waste Management Contract, 23p., Feb. 1975. 4 refs.

Diffusion modeling analyses of sulfur dioxide emissions from the Southeast thermal power plant located in the Minneapolis-St. Paul Air Quality Control Region (Minnesota) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 0.85 and 0.47 for nominal and maximum loads, respectively, on maximum concentration days and 0.11 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

55530 **APTIC NO. 75479**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. NORTHEAST-PENNSYLVANIA-UPPER DELAWARE VALLEY AQCR 151. *Office of Air and Waste Management Contract, 23p., Feb. 1975. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Hunlock Creek thermal power plant located in the Northeast Pennsylvania-Upper Delaware Valley Air Quality Control Region (Pennsylvania) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum load operations from the plant result in contributions to ambient air concentrations which by themselves exceed the primary 24-hour SO2 standard. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 13 and 15 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant.

55531 **APTIC NO. 75481**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. CHAMPLAIN VALLEY AQCR 159. *Office of Air and Waste Management Contract, 22p., Jan. 1975. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Moran thermal power plant located in the Champlain Valley Air Quality Control Region (New York and Vermont) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under nominal load operations at the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and SO2 standard, whereas emissions under maximum load operations do result in the 24-hour standard being exceeded. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 4.98 and 5.25 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant.

55532 **APTIC NO. 75514**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN ARIZONA-NEW MEXICO SOUTHERN BORDER AQCR 12 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-448, 21p., Feb. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Apache thermal power plant located in the Arizona-New Mexico Southern Border Air Quality Control Region (Arizona) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Emissions from the plant during either nominal or maximum load operations do not by themselves result in ground-level SO2 concentrations which exceed the 24-hour and annual average SO2 air quality standards. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 0.48 and 0.18 for nominal and maximum loads, respectively, on maximum concentration days and 0.079 for the maximum annual concentration. These values indicate the relative pollution potential of the plant. (Author conclusions modified)

55533 **APTIC NO. 75517**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN PHOENIX-TUCSON AQCR 15 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-430, 28p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from eight thermal power plants located in the Phoenix-Tucson Air Quality Control Region (Arizona) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions under both nominal and maximum load conditions from each of the plants do not by themselves result in contributions to the 24-hour ground-level SO2 concentrations which exceed the Federal air quality standard. The values the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.24-5.6 and 0.17-4.0 for nominal and maximum loads, respectively, on maximum concentration days and from 0.022-0.074 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. An interaction between contributions to ambient SO2 concentrations is likely to occur as a result of emissions from the Crosscut, Kyrene, and Ocotillo plants in the region. A more detailed and exhaustive analysis of all sources in the vicinity is recommended before any course of action for these plants is chosen. (Author conclusions modified)

55534 **APTIC NO. 75520**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN MONROE-EL DORADO AQCR 19 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-427, 22p., Jan. 1975. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Monroe-El Dorado Air Quality Control Region (Louisiana and Arkansas) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from each plant result in 24-hour and annual average concentrations which by themselves are well below the Federal air quality standards for SO2. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.62-2.2 and 0.22-2.1 for nominal and maximum loads, respectively, on maximum concentration days and from 0.039-0.21 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55535 **APTIC NO. 75523**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SHREVEPORT-

TEXARKANA-TYLER AQCR 22 (FINAL REPORT). Office of Air and Waste Management Contract 68-02-1483, Rept. EF-444, 27p., Feb. 1975. 6 refs.

Diffusion modeling analyses of sulfur dioxide emissions from nine thermal power plants located in the Shreveport-Texarkana-Tyler Air Quality Control Region (Texas, Louisiana, and Arkansas) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from each of the plants considered individually do not by themselves result in contributions to ambient air concentrations which exceed the 24-hour or annual SO2 standard. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.24-3.8 and 0.15-2.1 for nominal and maximum loads, respectively, on maximum concentration days and from 0.014-0.14 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. Analyses of future SO2 levels in areas where additional coal-fired installations are proposed are recommended. (Author conclusions modified)

55536 **APTIC NO. 75889**

Office of Air and Waste Management, Research Triangle Park, N. C., Office of Air Quality Planning and Standards

GUIDELINES FOR AIR QUALITY MAINTENANCE PLANNING AND ANALYSIS. VOLUME 9: EVALUATING INDIRECT SOURCES (FINAL REPORT). *Rept. EPA-450/4-75-001, OAQPS 1.2-028, 509p., Jan. 1975. 153 refs.*

A screening procedure that may be useful in assessing the maximum impact of a proposed indirect source on roadside concentrations of carbon monoxide in connection with the formulation and implementation of air quality maintenance plans is presented. The procedure is intended to be conservative so that if no potential problem is identified, there may be reasonable assurance than none will occur. Specific suggestions are made concerning the estimation of CO concentrations in the vicinity of signalized and unsignalized intersections as well as near locations where traffic is freely flowing. More detailed discussions concerning the estimation of emissions of CO in and around parking lots are contained in appendices to the document. Further discussions of techniques relating emissions to ambient 1- and 8-hour CO concentrations also appear in the appendices. (Author abstract modified)

55537 **APTIC NO. 75904**

Environmental Protection Agency, Boston, Mass., Regional Office I and Environmental Services of TRW, Inc., Vienna, Va.

IMPLEMENTATION PLAN REVIEW FOR VERMONT AS REQUIRED BY THE ENERGY SUPPLY AND ENVIRONMENTAL COORDINATION ACT (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1385, Rept. EPA-450/3-75-015, 38p., April 1975.*

NTIS: PB 242132/AS

An Environmental Protection Agency review of Vermont s implementation plan to determine if revisions can be made to regulations for stationary fuel combustion sources without intefering with the attainment and maintenance of National Ambient Air Quality Standards for sulfur dioxide and total suspended particulates is presented in accordance with the Energy Supply and Environmental Coordination Act of 1974. There are no Air Quality Control Regions which indicate any potential for revising regulations covering suspended particulate emissions from fuel combustion sources. The Champlain Valley Interstate AQCR is rated as a poor candidate for revising SO2 emission regulations, and the Vermont Intrastate AQCR is rated as marginal for SO2 regulation revision. (Author summary modified)

55538 **APTIC NO. 76925**

PARTIAL REVISION OF AIR POLLUTION CONTROL LAW. *(Taikiosen boshiho no ichibu kaisei). Text in Japanese. Aromatikkusu (Aromatics), 27(1):30-31, Jan. 1975.*

The partial revision of the air pollution control law was effected at the 72nd national assembly on November 30, 1974. The revised law was concerning total emissions limitation system. Total emission limitations were placed on sulfur oxides and 11 areas, including the Tokyo metropolis, Chiba city, and Osaka city were placed under the jurisdiction of the new law. The scale of factories with regard to the total emission control base, and the calculation of the total emissions control base were also enforced under the partially revised law.

55539 **APTIC NO. 76965**

GOVERNMENT ORDINANCES TO DECIDE DATE OF ENFORCEMENT OF PARTIAL AMENDMENTS TO AIR POLLUTION CONTROL LAW. GOVERNMENT ORDINANCES FOR THE PARTIAL AMENDMENT OF AIR POLLUTION CONTROL LAW ENFORCEMENT ORDINANCES. ORDER FROM PRIME MINISTER S OFFICE ON THE PARTIAL AMENDMENT OF ENFORCEMENT PROVISIONS TO AIR POLLUTION CONTROL REGULATIONS. *(Taiki osen boshi no ichibu o kaisei suru horitsu no shiko kijitsu o sadameru seirei. Taiki osen boshiho shikorei no ichibu o kaisei suru seirei. Taiki osen boshiho shiko kisoku no ichibu a kaisei suru sorifurei). Text in Japanese. Taiki Osen Nyusu (Air Pollution News), no. 87:7-16, March 1975.*

The text of the order from the Japan Prime Minister s Office (Order No. 71, November 30, 1974) is reproduced. Summaries of two government ordinances and a set of partial amendments to air pollution control regulations to which these ordinances apply are also included. Government Ordinance No. 374 sets the date of enforcement of regulations (Law No. 65, 1974), partially amending the air pollution control regulations, to be November 30, 1974. The partial amendments (Law No. 65, 1974) include the following points: Prefectural governors can establish more stringent schedules for reduction of total amounts of smoke (sulfur oxides) emission, subject to approval by the Prime Minister s Office, in designated pollution regions where maintenance of environmental standards is difficult by present procedures. Prefectural governors can order improvement in smoke treatment installations and order other necessary changes (such as fuel conversion). Fines will be levied for non-compliance. Government Ordinance No. 375 amends Air Pollution Control Regulations Enforcement Order (Ordinance No. 329, 1968) as follows. Types of smoke are defined by their content of sulfur oxides. Part of metropolitan Tokyo is to be included as one of the designated pollution regions. Desired Atmospheric environmental standards for smoke emission should be attained in March 1978, with due regard given to practical aspects of equipment installation and factory operation. Jurisdiction of the Department of Atmospheric Control is enumerated. Misprints in Ordinance No. 329 are corrected. Explanatory excerpts from the Air Pollution Control Regulations (Law No. 97, 1968) and the Basic Pollution Control Regulations (Law No. 132, 1965) are included. According to Law No. 97, smoke, as defined by law, in addition to sulfur oxides and products of combustion synthesis, and decomposition, also includes cadmium, chlorine, hydrogen fluoride, and lead.

55540 **APTIC NO. 76978**

Kanagawa Prefectural Goverment (Japan), Environmental Pollution Control Office

MONITORING SYSTEM OF PHOCHEMICAL POLLUTION: MONITORING NETWORK AND SURVEILLANCE FOR AIR POLLUTION. *(Kogakaku kogai no kanshi taisei: taiki osen jyoji kanshi sokuteimo). Text in*

Japanese. Kokagaku kogai no genjo to taisaku (Photochem. Pollut. Countermeasure), vol. 1975: 41, April 1975.

The air pollution monitoring system established iin April 1975 in the Kanagawa Prefecture is described. The first automated monitoring system was installed in 1964 at the Yokohama and Kawasaki areas, and data was collected on sulfur oxides and airborne dusts. Because of one increased number of monitoring stations, a telemeter system was introduced in 1969 for rapid data analyses. In 1970 through 1971, thee number of monitoring stations increased to 56, including 3 mobile units. They monitored SOx, airborne dust, oxidant, nitrogen oxides, hydrocarbons, carbon monoxide, and meteorological conditions. In 1974, 7 new stations were established to measure the amount of ultraviolet radiation in photochemical pollution. There were 73 monitoring stations by April 1975, 5 of which were mobile units. The monitoring stations were located throughout the prefecture and data were transmitted to the headquarter in Yokohama city, which is the central office of the air pollution control system in the Kanagawa prefecture.

55541 APTIC NO. 77200

Kanagawa Prefectural Government (Japan), Environmental Pollution Control Office

CONTROL MEASURES FOR PHOTOCHEMICAL POLLUTION. *(Kokagaku kogai no boshi taisaku). Text in Japanese. Kokagaku Kogai No Genjo To Taisaku (Present Situation Countermeasure Photochem. Pollut.), vol. 1975: 45-66, April 1975.*

The photochemical pollution control measures taken in Kanagawa Prefecture are discussed. The organizational structural and projects of newly established photochemical pollution control project team are given. The photochemical pollution forecasting system (pollution type, type of forecasting, forecasting standard), emergency control procedure (regional classification for emergency procedure, items for emergency control, major nitrogen oxides emission sources), communication system of the issuance of photochemical pollution emergency procedure (telecommunication system between air pollution monitoring center and major pollutant sources, TV, radio, newspaper), photochemical pollution control procedures specifically designed for schools to prevent mass afflications of schoolchildren due to photochemical pollution (emergency procedure which should be taken by schools for each type of forecasting issued, the emergency communication system to public and private schools, emergency procedures in the event of mass afflication), control measures for NOx emission (source control by emission standard, control procedure by law), control measures for hydrocarbon emissions, and control measures for automotive exhaust emission are described with some data.

55542 APTIC NO. 79127

California Air Resources Board, Sacramento

AIR POLLUTION IN CALIFORNIA. ANNUAL REPORT 1974. *86p., March 1975.*

The status of air pollution in California and efforts to control it are reviewed for the year 1974. Topics covered include: the state air monitoring network; air quality measurements of oxidants, sulfates, sulfur dioxide, carbon monoxide nitrogen dioxide, hydrocarbons, and suspended particulates; the health effects of various pollutants; trends in emissions and individual pollutant levels; the use of emission factors in assembling emission inventories; control programs for stationary and mobile sources of air pollution; plans for achieving and maintaining National Ambient Air Quality Standards; air pollution research programs; and legislation dealing with air pollution.

55543 APTIC NO. 79135

Stichting CONCAWE, The Hague (Netherlands)

EXISTING ENVIRONMENTAL REGULATIONS OF CONCERN TO THE OIL INDUSTRY IN WESTERN EUROPE. *Rept. 6/75, 35p., May 1975. 56 refs.*

A survey of environmental regulations in Western Europe of concern to the oil industry is presented. The survey includes: standard specifications and legal limits on fuel oil sulfur content and gasoline composition/quality; light-duty, gasoline-powered vehicle emission regulations; and a reference list of legislation and regulations, standards, technical requirements, and codes of practice for the design, construction, and operation of oil pipelines in Western Europe.

1974

55544 APTIC NO. 79071

Byrd, Eldon A. and Sherman Gee

DEFENSE TECHNOLOGY FOR ENVIRONMENTAL PROTECTION. *Naval Ordnance Lab., White Oak, Silver Spring, Md., Environmental Protection Agency-Naval Ordnance Laboratory Interagency Agreement EPA-IAG-133(D), Program Element NOL-830-X01-12, Rept. NOITR 74-174, 73p., July 1974. 215 refs.*

An assessment of the extent to which defense technology, residing in the Department of Defense laboratories and centers, is applicable toward helping meet the technological requirements in air pollution monitoring and control is presented along with a bibliography of Department of Defense documents relating to air pollution research. The bibliography covers such areas as air pollution measuring and monitoring technology, pollution control technology, particulate properties, aerosol generation, meteorology, pesticides, sampling methods, health effects, air-solid waste pollution technology, and air-water pollution technology. Specific technology transfer actions initiated between June 1973 and June 1974 are also described.

55545 APTIC NO. 77108

Dierschke, W.

STANDARD FORMS FOR A MORE EFFICIENT AUTHORIZATION PROCEDURE. *(Der Formularerlass - Grundlage fuer ein effektiveres Genehmigungsverfahren). Text in German. Luftverunreinigung, p. 29-33, 1974.*

The introduction of standard forms as a basis for a more efficient authorization procedure for industrial and other facilities capable of generating environmental hazards and nuisances will enable licensing authorities to make decisions concerning authorization. The introduction of standard forms, including technological flow diagrams indicating all possible emission sources, to be prepared by the applicant, was prompted by the frequent insufficiency and irrelevancy of data supplied by the applicants, and by the lack of proof of compliance with the authorization requirements. The new standard form is applicable to all kinds of facilities.

55546 APTIC NO. 77141

Kubota, Torahide

THE RELATIONSHIP BETWEEN POLLUTION, PRICES, RESOURCES, AND MERCHANDISE DEVELOPMENT. *(Kogai to bukka, shigen, shohin kaihatsu tono kanren). Text in Japanese. Kankyo Sozo (Environ. Creaction), 4(6):25-32, June 1974.*

The necessity for the development of a closed system is discussed. In the past, so much emphasis was placed on developing new substances and new products, and waste control measures were neglected. As a result, air pollution increased. Unless the two are developed simultaneously air pollution will spread, prices will rise and there will be economic confusion. A waste control program must be developed first. Emission standards must be lowered if production is to increase. Production and recycling must go hand in hand. As technology increases the rate of recovery from 99.9% to 99.9999%, the difficulty in lowering emission standards increases, cost rise, prices increase, sale of products decrease, resources are used less, and air pollution decreases. The control of the absolute volume of pollutants will stimulate the progress of scientific technology. If raw materials are fully utilized, and recovered raw material is also used, the cost of raw material will decrease. Even though recovered material is not costly, at the risk of giving up part of the profit, it must be recovered and used. If an entirely pollution-free system cannot be adopted, there must be recovery of usable material.

55547 **APTIC NO. 79004**

Lieberman, Daniel and William C. Lockett

AIR QUALITY, LAND USE AND TRANSPORTATION MODELS - EVALUATION AND UTILIZATION IN THE PLANNING PROCESS (STAFF REPORT). *California Air Resources Board, Sacramento, Evaluation and Planning, Department of Housing and Urban Development Grant CPA-CA-09-39-1032, Proj. CPA 1032-.207, 98p., July 1974. 60 refs.*

NTIS: PB 237867

Air quality, land use, and transportation modeling techniques are discussed in terms of incorporating air quality considerations into planning processes. Transportation and air quality models form the nucleus of a modeling system for evaluating direct and indirect sources of carbon monoxide, hydrocarbons, and nitrogen oxides. An air quality model alone is the key element for evaluating sulfur dioxide, particulates, and other pollutants from stationary sources. Land use projection models are essential when estimates of future impacts are desired. Air quality impact evaluation systems composed of land use, transportation, and air quality models can be effectively utilized in the planning process only if the reiterative relationship between models is recognized. Criteria need to be established for each air basin to weight air quality considerations in relation to all other considerations of land use planning before modeling systems can be effective tools in decision making processes. (Author summary modified)

55548 **APTIC NO. 76922**

Moriya, Shoju

ANALYZERS FOR FIXED SOURCES OF PUBLIC HAZARD. *(Kotei hasseigen-yo kogai bunseki-kei). Text in Japanese. Sekiyu to Sekiyu Kagaku (Petrol. Petrochem.), 18(3):61-65, March 1974.*

The rapid development of the petrochemical industry served as a driving force in the development of continuous analyzers. At present, 45 anti-public hazard institutes and public hazard centers in all exist throughout the country. There is currently a trend to require large industries as well as small- and medium sized industries to install continuous measurement or sampling equipment. Since regulations for public hazards are determined on community basis by local governments, according to the law on countermeasures against public hazard, there exists a strong relationship between local governments and citizens.

55549 **APTIC NO. 79044**

Palmedo, P., C. Comar, K. Cowser, S. Hanna, C. Huang, P. Kolburn, B. Manowitz, L. Niemeyer, J. Olson, R. Papetti, D. Reichle, D. Rote, and E. Rubin

TECHNOLOGY AND ENVIRONMENTAL IMPACT. *Environmental Protection Agency, Washington, D. C., Div. of Meteorology and Atomic Energy Commission, Washington, D. C., Div. of Biomedical and Environmental Research, Chem. Meteorol. Workshop-1974, Ft. Lauderdale, Fla., 1974, p. 1-18. 6 refs. (Jan. 14-18.)*

Elements of a self-sufficient energy strategy are discussed in terms of the need to further research their environmental impacts. Energy generation processes considered include: increased use of coal (combustion, liquefaction, gasification); oil shale extraction; accelerated nuclear implementation; solar and wind power, geothermal power, and hydrogen energy systems. Areas requiring more research include the health effects of emissions from these processes, chemical transformation effects, the atmospheric transport of pollutants, the implementation of standards, and control measures to reduce pollutant emissions. More attention to the regional scale of environmental aspects of energy planning is required since it is only at this scale that the complex relationships between energy technologies, air quality, human health, social impacts, and economic costs can be examined in adequate detail.

55550 **APTIC NO. 79220**

Troncin, P.

USING OZONE TO DEODORIZE GASES EVACUATED TO THE OUTDOORS. *(La desodorisation par l ozone de gaz evacues a l exterieur). Text in French. Chaud Froid Plomberie, 28(334):94-96, Feb. 1974.*

General rules concerning the use of ozone for the deodorization of gases emitted by industries and in living quarters are presented. The ozone generator should be installed in a high place because ozone is heavier than air. Some 2 to 5% of the air or gas to be ozonized should be led through the ozone generator. The ozone concentration in living quarters shall not exceed 0.1 ppm. Living quarters shall be evacuated before ozonization. The ozone concentration shall not exceed 0.5-1 ppm in air emitted from kitchens. Ozone concentrations between 5 and 12 ppm are required for the deodorization of gases with a pungent odor, and 10 ppm ozone concentration is necessary for rapid disinfection.

55551 **APTIC NO. 75452**

Abcor Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR FUEL CONVERSION. HARTFORD- NEW HAVEN-SPRINGFIELD AQCR 42. *Office of Air and Waste Management Contract, 18p., June 11, 1974. 1 ref.*

Diffusion modeling analyses of sulfur dioxide and particulate emissions from eight thermal power plants located in the Hartford- New Haven-Springfield Interstate Air Quality Control Region are presented as part of an effort to determine the air quality impact of conversion from oil- to coal-firing in the face of the present oil shortage. The nominal and maximum 24-hour SO2 concentrations resulting from such conversion range from 30-1748 micrograms/cu m and from 37-1930 micrograms/cu m, respectively. Nominal and maximum 24-hour particulate concentrations are estimated to range from 2-342 and 2-453 micrograms/cu m, respectively. Maximum annual sulfur dioxide and particulate concentrations are expected to range from 3-66 micrograms/cu m and from less than 1 to 12 micrograms/cu m, respectively.

55552 **APTIC NO. 75462**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SOUTHERN DELAWARE AQCR 46. *Office of Air and Waste Management Contract, 24p., Dec. 26, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the McKee Run and Indian River thermal power plants located in the Southern Delaware Air Quality Control Region (Delaware) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from each plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rates of the plants, in micrograms/cu m per g/sec, range from 0.12 (Indian River) to 0.78 (McKee Run) and from 0.11 (Indian River) to 0.51 (McKee Run) for nominal and maximum loads, respectively, on maximum concentration days and from 0.0073 (Indian River) to 0.052 (McKee Run) for the maximum annual concentration. These values indicate the relative pollution potential of the plants.

55553 **APTIC NO. 75463**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. CENTRAL FLORIDA AQCR 48. *Office of Air and Waste Management Contract, 28p., Dec. 30, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five power plants located in the Central Florida Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from each of the five plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rates of the plants range from 0.065-1.29 and from 0.055-0.68 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0044-0.12 for the maximum annual concentration. These values indicate the relative pollution potential of the plants.

55554 **APTIC NO. 75464**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SOUTHEAST FLORIDA AQCR 50. *Office of Air and Waste Management Contract 28p., Oct. 31, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from seven thermal power plants located in the Southeast Florida Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from each of the plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values of the ratio of the ambient SO2 concentration to the emission rate for a given plant, in micrograms/cu m per g/sec, range from 0.056-2.22 and 0.054-1.10 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0054-0.35 for the maximum annual concentration. These values indicate the relative pollution potential of the plants.

55555 **APTIC NO. 75465**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SOUTHWEST FLORIDA AQCR 51. *Office of Air and Waste Management Contract, 25p., Oct. 31, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Fort Myers and Avon Park thermal power plants located in the Southwest Florida Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum load operations at both plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate for a given plant, in micrograms/cu m per g/sec, range from 0.067 (Fort Myers) to 0.75 (Avon Park) and from 0.065 (Fort Myers) to 0.83 (Avon Park) for nominal and maximum loads, respectively, on maximum concentration days and from 0.0054 (Fort Myers) to 0.086 (Avon Park) for the maximum annual concentration. These values indicate the relative pollution potential of each plant.

55556 **APTIC NO. 75471**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN PORTLAND AQCR 110. *Office of Air and Waste Management Contract, 22p., Nov. 12, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Wyman thermal power plant located in the Metropolitan Portland Air Quality Control Region (Maine) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 0.40 and 0.33 for nominal and maximum loads, respectively, on maximum concentration days and 0.037 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

55557 **APTIC NO. 75472**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN BALTIMORE AQCR 115. *Office of Air and Waste Management Contract, 25p., Dec. 19, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five thermal power plants located in the Metropolitan Baltimore Air Quality Control Region (Maryland) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from each of thee plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.084-0.70 and 0.050-0.39 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0053-0.027 for the maximum annual concentration. These values indicate the relative pollution potential of each plant.

55558 **APTIC NO. 75473**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. METROPOLITAN BOSTON AQCR 119. *Office of Air and Waste Management Contract, 26p., Nov. 7, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five thermal power plants located in the Metropolitan Boston Air Quality Control Region (Massachusetts) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the Edgar, L Street, Mystic, New Boston, and Kendall Square plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard. Emissions from the latter four plants also result in the primary annual SO2 standard not being exceeded. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.17-1.30 and 0.18-1.16 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0087-0.18 for the maximum annual concentration. These values indicate the relative pollution potential of each plant.

55559 **APTIC NO. 75478**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. NORTHERN PIEDMONT AQCR 136. *Office of Air and Waste Management Contract, 23p., Dec. 20, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Dan River thermal power plant located in the Northern Piedmont Air Quality Control Region (North Carolina) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentration which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 0.54 and 0.62 for nominal and maximum loads, respectively, on maximum concentration days and 0.035 for the maximum annual concentration. These values indicate the relative pollutionn potential of the plant.

55560 **APTIC NO. 75480**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. CENTRAL NEW YORK AQCR 158. *Office of Air and Waste Management Contract, 23p., Dec. 20, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Oswego thermal power plant located in the Central New York Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions from both nominal and maximum load operations at the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 0.18 and 0.14 for nominal and maximum loads, respectively, on maximum concentration days and 0.013 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

55561 **APTIC NO. 75482**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. GENESEE-FINGER LAKES AQCR 160. *Office of Air and Waste Management Contract, 24p, Nov. 22, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Genesee-Finger Lakes Air Quality Control Region (New York) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the Greenidge, Rochester 3, and Rochester 7 plants result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour SO2 standard, and emissions from the latter two plants do not cause the primary annual SO2 standard to be exceeded. The values for the ratio of the ambient SO2 concentration to the emission rates of the plants, in micrograms/cu m per g/sec, range from 0.13-0.48 and 0.13-0.47 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0099-0.014 for the maximum annual concentration. These values indicate the relative pollution potential of the plants.

55562 **APTIC NO. 75483**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. NIAGARA FRONTIER AQCR 162. *Office of Air and Waste Management Contract, 22p., Nov. 22, 1974. 3 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Huntley thermal power plant located in the Niagara Frontier Air Quality Control Region (New York) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum loads from the plant result in contributions to ambient air concentrations which by themselves do not exceed the primary 24-hour and annual SO2 standards. The values for the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 0.054 and 0.043 for nominal and maximum loads, respectively, on maximum concentration days and 0.0041 for the maximum annual concentration. These values indicate the relative pollution potential of the plant.

55563 **APTIC NO. 75484**

Abcor, Inc., Cambridge, Mass., Walden Research Div.

MODELING ANALYSIS OF POWER PLANTS FOR EVALUATION OF IMPACT OF AMBIENT SO2 CONCENTRATIONS. SOUTHERN TIER EAST AQCR 163. *Office of Air and Waste Management Contract, 24p., Nov. 12, 1974. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Goudey and Jennison thermal power plants located in the Southern Tier East Air Quality Control Region (New York) are presented as part of an effort to determine the air quality impact of changes in fuel use and possible compliance schedule extensions. Emissions under both nominal and maximum load operations at the Jennison plant result in contributions to ambient air concentrations which by themselves exceed the primary 24-hour SO2 standard. Emissions under nominal load operations at the Goudey plant also result in the 24-hour standard being exceeded, although those generated during maximum load operations do not result in the 24-hour standard being surpassed. The values for the ratio of the ambient SO2 concentration to the emission rates of the plants, in micrograms/cu m per g/sec, range from 0.83 (Goudey) to 3.38 (Jennison) and from 0.72 (Goudey) to 3.01 (Jennison) for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plants.

55564 **APTIC NO. 75513**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN EAST ALABAMA AQCR 003 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-386, 21p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Gadsden thermal power plant located in the East Alabama Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from the plant, under nominal load conditions, do not alone result in the 24-hour ambient air quality standard for SO2 being exceeded; they do, however, result in the 24-hour standard being exceeded during maximum load conditions. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant are 0.88 and 1.4 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant. (Author conclusions modified)

55565 **APTIC NO. 75515**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN CLARK-MOHAVE AQCR 13 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-419, 25p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five thermal power plants located in the Clark-Mohave Air Quality Control Region (Nevada and Arizona) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Only the Mohave plant produces emissions under nominal and maximum load conditions which result in contributions to ambient air concentrations which by themselves exceed the 24-hour primary SO2 standard. None of four power plants that were evaluated for annual average SO2 contributions exceed the annual average SO2 air quality standard when considered separately from all other sources. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.40-1.60 and 0.44-1.70 for nominal and maximum loads, respectively, on maximum concentration days and from 0.28-0.22 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55566 **APTIC NO. 75516**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN FOUR CORNERS AQCR 14 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-409, 22p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Four Corners and Cholla thermal power plants located in the Four Corners Air Quality Control Region (New Mexico and Arizona) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Emissions under both nominal and maximum load conditions from the Cholla plant result in contributions to ambient air concentrations which by themselves do not exceed the 24-hour primary standard for SO2, whereas at the Four Corners plant the 24-hour standard is exceeded as a result of the plant s emissions. The values of the ratio of the ambient SO2 concentration to the emission rate of each plant, in micrograms/cu m per g/sec, range from 0.22 (Four Corners) to 0.27 (Cholla) and from 0.26 (Four Corners) to 0.31 (Cholla) for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55567 **APTIC NO. 75518**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN CENTRAL ARKANSAS AQCR 16. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-376, 25p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Lake Catherine and Lynch thermal power plants located in the Central Arkansas Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions under nominal and maximum load conditions from each plant do not result in ground- level concentrations which exceed the 24-hour SO2 ambient air quality standard. The maximum SO2 concentrations resulting from emissions by the Lake Catherine plant at maximum load come close to equaling the 24-hour standard, however. Emissions from the Lynch plant result in annual average SO2 concentrations which are negligible compared with the annual average standard. The effect of annual SO2 emissions from the Lake Catherine plant is not determined. The values of the ratio of the ambient SO2 concentration to the emission rate of each plant, in micrograms/cu m per g/sec, range from 0.61 (Lake Catherine) to 0.74 (Lynch) and from 0.25 (Lynch) to 0.47 (Lake Catherine) for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55568 **APTIC NO. 75519**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN MEMPHIS AQCR 18. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-373, 21p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Tennessee Valley Authority s Allen steam plant located in the Metropolitan Memphis Air Quality Control Region (Tennessee) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from the plant under maximum load conditions, but not under nominal load conditions, singularly result in calculated ground-level concentrations which exceed the 24-hour ambient air quality standard. Calculated annual average SO2 concentrations for the Allen plant do not exceed the annual average air quality standard. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 0.11 and 0.12 for nominal and maximum loads, respectively, on maximum concentration days and 0.0052 for the maximum annual concentration. These values indicate the relative pollution potential of the plant. (Author conclusions modified)

55569 **APTIC NO. 75521**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHEAST ARKANSAS AQCR 20 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. 420, 22p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dixoide emissions from three thermal power plants located in the Northeast Arkansas Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Emissions under either nominal or maximum load conditions at each plant produce contributions to ambient SO2 concentrations which do not exceed the Federal 24-hour air quality standard. Emissions from each plant under nominal load conditions do not result in the annual average standard being exceeded. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, ranged from 0.14-0.72 and 0.10-0.58 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0084-0.065 for the maximum annual average concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55570 **APTIC NO. 75522**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHWEST ARKANSAS AQCR 21 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-403, 20p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Fitzhugh thermal power plant located in the Northwest Arkansas Air Quality Control Region (Arkansas) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from the plant, under both nominal and maximum load conditions, result in ground level SO2 concentrations which by themselves greatly exceed the 24-hour ambient air quality standard. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 29 and 34 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of the plant. (Author conclusions modified)

55571 **APTIC NO. 75524**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN GRAND MESA AQCR 035. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-380, 19p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Nucla and Cameo thermal power plants located in the Grand Mesa Air Quality Control Region (Colorado) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from the Nucla plant during both nominal and maximum load operations result in ground- level SO2 concentrations which by themselves exceed the 24-hour ambient air quality standard, whereas SO2 emissions from the Cameo plant do not result in the standard being exceeded. The values of the ratio of the ambient SO2 concentration to the emission rate of each plant, in micrograms/cu m per g/sec, range from 4.9 (Cameo) to 23 (Nucla) and from 4.7 (Cameo) to 22 (Nucla) for nominal and maximum loads, respectivvely, on maximum concentration days. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55572 **APTIC NO. 75525**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN DENVER 36 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-405, 22p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the Metropolitan Denver Air Quality Control Region (Colorado) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from each of the plants do not result in either the annual or the 24-hour air quality standards being exceeded during nominal or maximum load operations. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.065-0.79 and 0.075-0.65 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0031-0.044 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55573 **APTIC NO. 75526**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SAN ISABEL AQCR 38 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-383, 26p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants in the San Isabel Air Quality Control Region (Colorado) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from the Clark plant under both nominal and maximum load conditions and from the Drake plant under maximum load conditions exceed the 24-hour SO2 standard. New additions planned for Pueblo and El Paso Counties, totaling 700 and 305 MW, respectively, may result in significant air quality deterioration. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.94-13 and 0.63-15 for nominal and maximum loads, respectively, on maximum concentration days and from 0.68-0.90 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55574 **APTIC NO. 75527**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN YAMPA AQCR 40 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-378, 20p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Hayden thermal power plant located in the Yampa Air Quality Control Region (Colorado) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions under either nominal or maximum load conditions at the plant do not result in the 24-hour ambient air quality standard being exceeded. A new 250 MW coal-fired addition planned for the Hayden plant may, however, result in combined contributions to SO2 concentrations which exceed the 24-hour standard. Further analysis of the possible impacts of the addition is necessary. The values of the ratio of the ambient SO2 concentration to the emission rate of the plant, in micrograms/cu m per g/sec, are 1.37 and 1.49 for nominal and maximum loads, respectively, on maximum concentration days. (Author conclusions modified)

55575 **APTIC NO. 75528**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN CHICAGO AQCR 67 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-381, 27p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 11 thermal power plants located in the Metropolitan Chicago Air Quality Control Region (Illinois) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. The Joliet plant produces enough SO2 emissions under maximum load conditions to singularly exceed the 24-hour primary air quality standard. The burning of high-sulfur coal (3.0%) at this plant contributes to its exceeding the standard. Although no other incidents of power plants contributing to violations of primary air quality standards are recorded, interactive effects in this highly developed urban area must be considered before final decisions concerning these plants are made. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.040-0.37 and 0.031-0.023 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0021-0.021 for the maximum annual concentration. These values indicate the relative pollution potential of the each plant. (Author conclusions modified)

55576 **APTIC NO. 75529**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN DUBUQUE AQCR 68. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-368, 24p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Metropolitan Dubuque Air Quality Control Region (Iowa and Wisconsin) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Emissions from the Dubuque and Stoneman plants, under nominal and maximum load conditions, are sufficient by themselves to cause the 24-hour average air quality standard to be exceeded. The 24-hour SO2 standard is not exceeded as a result of emissions from the Nelson-Dewey plant. The plume interaction effects in the region are small, and most violations of air quality standards are caused by emissions from single plant emissions. The values of the ratio of the ambient SO2 concentration tc the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.21-4.77 and 0.25-4.13 for nominal and maximum loads, respectively, on maximum concentration days. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55577 **APTIC NO. 75530**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN QUAD CITIES AQCR 69. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-353, 21p., Oct. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Metropolitan Quad Cities Air Quality Control Region (Iowa and Illinois) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Emissions under nominal and maximum load conditions from the Riverside plant and emissions under maximum load conditions from the Moline plant result in contributions to ambient air concentrations which by themselves exceed the 24-hour primary SO2 standards. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.18-2.62 and 0.17-1.55 for nominal and maximum loads, respectively, on maximum concentration days and from 0.012-0.17 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55578 **APTIC NO. 75531**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN ST. LOUIS AQCR 070 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-393, 27p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from nine power plants located in the Metropolitan St. Louis Air Quality Control Region (Illinois and Missouri) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability The annual mean and 24-hour ambient air quality standards for SO2 are not exceeded by contributions tc ground- level SO2 concentrations by any of the plants operating at nominal load and considered separately. However, SO2 emissions from the Wood River and Venice-II plants at maximum load do result in the 24-hour standard being exceeded. A significant interaction of SO2 plumes from the Ashley, Cahokia, Labadie, Sioux, Venice-I, Venice-II, and Wood River plants is expected. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu cm per g/sec, range from 0.019-0.57 and 0.023-0.32 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0010-0.052 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55579 **APTIC NO. 75532**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN ROCKFORD-BELOIT-JANESVILLE AQCR 73 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-384, 22p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from three thermal power plants located in the Rockford-Beloit-Janesville Air Quality Control Region (Illinois and Wisconsin) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Emissions from each plant under either nominal or maximum load produce concentrations of SO2 which do not by themselves exceed the 24-hour standard. However, under maximum load conditions, contributions to ambient air SO2 concentrations by the Rock River and Sabrooke plants approach the 24-hour standard. The maximum annual average SO2 concentrations from emissions by each plant fall well below the annual average SO2 standard. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.20-0.80 and 0.18-0.73 for nominal and maximum loads, respectively, on maximum concentration days and from 0.018-0.039 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55580 **APTIC NO. 75533**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN OMAHA-COUNCIL BLUFFS AQCR 85. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-339, 21p., Oct. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the Metropolitan Omaha-Council Bluffs Air Quality Control Region (Iowa and Nebraska) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Nominal load emissions from the Kramer and North Omaha plants and maximum load emissions from North Omaha and Jones plants result in ambient concentrations which exceed the 24-hour ambient SO2 standard. No plants in the AQCR individually exceed the annual average SO2 standard, and there is no significant interaction of emissions at any location in the region. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.15-1.22 and 0.18-0.74 for nominal and maximum loads, respectively, on maximum concentration days and from 0.022-0.10 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55581 **APTIC NO. 75534**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN SIOUX CITY AQCR 86. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-352, 21p., Oct. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Big Sioux and George Neal thermal power plants located in the Metropolitan Sioux City Air Quality Control Region (Iowa) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. The primary annual mean and 24-hour maximum ambient air quality standards for SO2 are not exceeded by contributions from emissions at either plant, and there is no significant interaction of SO2 plumes in the region. The values of the ratio of the ambient

SO2 concentration to the emission rate of each plant, in micrograms/cu m per g/sec, ranges from 0.11 (George Neal) to 0.40 (Big Sioux) and 0.082 (George Neal) to 0.11 (Big Sioux) for nominal and maximum loads, respectively, on maximum concentration days and from 0.0099 (George Neal) to 0.019 (Big Sioux) for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55582 **APTIC NO. 75535**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN SIOUX FALLS AQCR 87. *Office of Air and Waste Management Contract 68-02-1483, Rept. E-363, 20p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Pathfinder and Lawrence thermal power plants located in the Metropolitan Sioux Falls Air Quality Control Region (South Dakota) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Ground-level SO2 concentrations resulting from emissions generated by each plant are below the primary 24-hour and annual average SO2 standards. The interactive effects of the two plants are significant at selected receptor points but do not result in concentrations which exceed the SO2 National Ambient Air Quality Standards. The values of the ratio of the ambient SO2 concentration to the emission rate of each plant, in micrograms/cu m per g/sec, range from 1.73 (Lawrence) to 2.04 (Pathfinder) and 1.15 (Lawrence) to 1.33 (Pathfinder) for nominal and maximum loads, respectively, on maximum concentration days and from 0.16 (Pathfinder) to 0.17 (Lawrence) for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55583 **APTIC NO. 75536**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN NORTHEAST IOWA AQCR 88 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-357, 23p., Oct. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from five thermal power plants located in the Northeast Iowa Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Emissions under nominal load and maximum load conditions from the Lansing and Prairie Creek Number 1-2-3 plants result in contributions to ambient air concentrations which by themselves exceed the 24-hour SO2 standard. Emissions under maximum load conditions from the Sixth Street plant also result in the 24-hour SO2 standard being exceeded. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.18-15.4 and 0.13-23.4 for nominal and maximum loads, respectively, on maximum concentration days and from 0.019-0.081 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55584 **APTIC NO. 75537**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN SOUTH CENTRAL IOWA AQCR 92. *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-364, 21p., Nov. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from four thermal power plants located in the South Central Iowa Air Quality Control Region are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Emissions under nominal and maximum load conditions from the Des Moines and Bridgeport plants result in contributions to ambient air concentrations which by themselves exceed the 24-hour SO2 standards. Emissions from the Sutherland plant under maximum load conditions also cause the 24-hour SO2 standard to be exceeded. Emissions under nominal conditions from any single plant in the region do not produce contributions to ambient air concentrations which by themselves exceed the primary annual mean SO2 standard. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.36-2.2 and from 0.40-1.76 for nominal and maximum loads, respectively, on maximum concentration days and from 0.028-0.16 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55585 **APTIC NO. 75538**

GEOMET, Inc., Gaithersburg, Md.

MODELING OF THE IMPACT OF POWER PLANTS ON AMBIENT SO2 CONCENTRATIONS IN METROPOLITAN KANSAS CITY AQCR 094 (FINAL REPORT). *Office of Air and Waste Management Contract 68-02-1483, Rept. EF-394, 31p., Dec. 1974. 6 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 12 thermal power plants located in the Metropolitan Kansas City Air Quality Control Region (Kansas and Missouri) are presented as part of an effort to determine the air quality impact of changes in fuel use and state implementation plans in the face of limited fuel availability. Sulfur dioxide emissions from the Missouri City, Quindaro Number 2, Kaw, Sibley, Quindaro Number 3, Green, Blue Valley, and Lakeroad plants at maximum load, when considered separately, result in ground-level SO2 concentrations which exceed the 24-hour ambient air quality standard. At least eight power plants are located sufficiently close to at least one other power plant so that interaction between SO2 levels due to plant emissions may be significant. Sulfur dioxide emissions resulting from future operations of a 145 MW addition at the Blue Valley plant may result in significant air quality deterioration in the area. The values of the ratio of the ambient SO2 concentration to the emission rate of a given plant, in micrograms/cu m per g/sec, range from 0.067-5.2 and from 0.075-2.6 for nominal and maximum loads, respectively, on maximum concentration days and from 0.0066-0.52 for the maximum annual concentration. These values indicate the relative pollution potential of each plant. (Author conclusions modified)

55586 **APTIC NO. 77127**

Environment Agency, Tokyo (Japan)

ENVIRONMENTAL LAWS AND REGULATIONS IN JAPAN. *317p., 1974.*

Both air pollution and other forms of pollution are discussed. The Basic Law for Environmental Pollution Control is included, along with provisions for punishment for violations creating health hazards and compensation for pollution-related health damage. The Air Pollution Control Law includes provisions regulating soot and smoke emission and particulate matter from stationary sources and providing for limits on motor vehicle exhausts. It requires monitoring of air pollution levels and includes a procedure for dealing with emergency situations. The law also includes provisions for inspection and for punishment of violators. The Enforcement Ordinances of the Air Pollution Control Law specify the substances to be regulated and emergency pollutant levels and classify stationary pollutant sources. Appendices contain standards for ambient air quality and emissions.

55587 **APTIC NO. 77234**

Central Council for Environmental Pollution Control (Japan), Planning Committee

LONG-TERM PROSPECTUS FOR PRESERVATION OF THE ENVIRONMENT: AN INTERIM REPORT. *p. 1-71, 1974.*

Air pollution as well as water pollution and refuse are included in the long-range environmental considerations. Pollution forecasts are made for 1985 for Japan as a whole, with sulfur considered as a typical air pollutant. Pollution forecasts are made for 1980 for various regions of Japan, considering soot and particulates as well as sulfur. The increased public desire for environmental improvement is discussed. A model is used to predict the economic effects of environmental protection. Advances in environmental technology are predicted, including development of an effective carbon monoxide elimination device for automobiles and an economical device for eliminating hydrogen fluorides in 1977, and development of an economical catalyst for eliminating the emission of nitrogen oxides from stationary sources in 1978. Maintaining an environment which protects human health is stressed as the primary objective of environmental planning.

1973

55588 **APTIC NO. 75403**

Environmental Protection Agency, Research Triangle Park, N. C., Source Receptor Analysis Branch

FUEL DISTRIBUTION STUDY FOR THE INDIANAPOLIS, SOUTHERN INDIANA AND WABASH VALLEY AQCR S 80, 83, AND 84. *44p., March-April 1973.*

Diffusion modeling analyses of sulfur dioxide emissions from thermal power plants in the Southern Indiana, Indianapolis, and Wabash Valley Air Quality Control Regions (Indiana) are presented along with fuel distribution studies as part of an effort to determine the nominal and maximum air quality impacts of fuel use changes in the face of a low-sulfur coal supply deficit. An analysis of the nominal impact situation indicates that all of the large power plants in the three AQCR s can be exempted by a variance, or limited variance, without exceeding thee primary 24-hour and annual air quality standards. A variance allows continued use of coal with a sulfur content the same as for 1970; a limited variance requires some sulfur content reduction and appears to be required for one power plant in Wabash Valley in order not to exceed the 24-hour standard. A sulfur content reduction of about 21% is required at this plant. The effect of considering the maximum impact case is to increase the number of plants requiring a limited variance from one to four and to require a greater reduction in sulfur content at the Wabash River plant. However, the required reductions in sulfur content are still much less stringent than state implementation plan requirements.

55589 **APTIC NO. 79192**

De Falco, Paul, Jr.

LOS ANGELES, CALIFORNIA TRANSPORTATION CONTROL PLAN FIELD HEARINGS. *In: Implementation of Transportation Controls. 93rd Congress (Senate), First Session, Serial 93-H29, p. 390-403, Nov. 16, 1973. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

A proposed transportation control plan for the Los Angeles Air Quality Control Region is described. Measures in the plan include the following: a review of all new parking facilities with more than 50 spaces to determine their air quality impact, fees to increase parking costs at existing facilities, a ban on motorcycle use if stringent emission standards for new motorcycles are not established, mandatory inspection and maintenance of light-duty vehicles, bus-carpool lanes and preference systems, steps by employers to discourage single-passenger car commuting by employees, retrofits of catalysts by 1977, the installation of vacuum spark advance disconnect devices on some existing light-duty vehicles, and a gasoline sales limitation by 1977.

55590 **APTIC NO. 75404**

Office of Air and Water Programs, Atlanta, Ga., Monitoring and Data Analysis Div.

FUEL DISTRIBUTION STUDY FOR FIVE MIDWEST AQCR S 71, 75, 78, 173, AND 177. *33p., May 1973. 1 ref.*

Diffusion modeling analyses of sulfur dioxide emissions from 16 thermal power plants located in the North Central Illinois, West Central Illinois, Louisville Interstate, Dayton, Ohio, and Northwest Ohio Air Quality Regions (Illinois, Kentucky, and Ohio) are presented along with fuel distribution studies as part of an effort to determine the nominal and maximum air quality impacts of fuel use changes in the face of a low-sulfur coal supply deficit. An analysis of the maximum impact case reveals that five plants can obtain a full variance and four a limited variance in implementation plan requirements without exceeding the 24-hour and annual SO2 air quality standards in the area. No variance is possible for the remaining seven plants. There are five power plants in the West Central Illinois AQCR which even at implementation plan requirements appear to exceed the 24-hour standard. The net effect of the variances is to free about 8.5 million tons/yr of coal.

55591 **APTIC NO. 75405**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. METROPOLITAN BIRMINGHAM AQCR 4. *Office of Air and Water Programs Contract, 31p., Sept. 11, 1973. 2 refs.*

Diffusion modeling analyses of three thermal power plants located in the Metropolitan Birmingham Air Quality Control Region (Alabama) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plans in the face of a low-sulfur coal supply deficit. The application of full variances to each of the power plants does not seem likely to jeopardize attainment of the 24-hour and annual primary air quality standards in the region. The projected average sulfur content of coal used by power plants in the region is 0.72% under implementation plan regulations as compared with 1.30% for nominal load, maximum load, and maximum concentration conditions. (Author conclusions modified)

55592 **APTIC NO. 75406**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. MOBILE-PENSACOLA-PANAMA CITY-SOUTHERN MISSISSIPPI AQCR 5. *Office of Air and Water Programs Contract, 38p., Nov. 5, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from 12 thermal power plants located in the Mobile-Pensacola-Panama City-Southern Mississippi Air Quality Control Region (Alabama, Florida, and Mississippi) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plans in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard does not appear to be jeopardized by the application of full variances to the Crist, Lansing-Smith, Scholz, Barry, and Chickasaw plants or by the application implementation plan status at the Watson, Baxter Wilson, Natchez, Rex Brown, Eaton, Sweatt, and Moselle plants. Attainment of the annual primary standard is not likely to be endangered by the application of full variances to the Crist, Lansing-Smith, Scholz, Barry, and Chickasaw plants or by the application of implementation plan status at the Baxter Wilson, Natchez, Rex Brown, Eaton, Jack Wilson, Sweatt, and Moselle plants. The projected average sulfur content of coal used by power plants in the region is 1.3% under implementation plan regulations as compared with 1.7% for nominal load, maximum load, and maximum concentration conditions. (Author conclusions modified)

55593 **APTIC NO. 75407**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. TENNESSEE RIVER VALLEY AQCR 7. *Office of Air and Water Programs Contract, 31p., July 22, 1973.*

Diffusion modeling analyses of sulfur dioxide emissions from the Colbert and Widows Creek thermal power plants located in the Tennessee River Valley Air Quality Control Region (Alabama) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plans in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour and annual primary air quality standards does not appear to be jeopardized by the application of a limited variance to the Colbert plant. Attainment of the 24-hour standard at the Widows Creek plant does not appear likely even under implementation plan status. The projected average sulfur content of coal used by the plants is 0.70% under implementation plan regulations, 1.32% for the nominal load case, and 1.11% for the maximum load and maximum concentration cases. (Author conclusions modified)

55594 **APTIC NO. 75408**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. JACKSONVILLE-BRUNSWICK AQCR 49. *Office of Air and Water Programs Contract, 32p., Oct. 11, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from nine thermal power plants located in the Jacksonville-Brunswick Air Quality Control Region (Florida and Georgia) are presented as part of an effort to determine the air quality impact of proposed variances to implementation plans in the face of a low- sulfur coal supply deficit. Implementation plan status is indicated for all the power plants in the region because they are all projected to burn only residual oil. Attainment of the 24-hour and annual primary air quality standards does not appear to be jeopardized in the region. (Author conclusions modified)

55595 **APTIC NO. 75409**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. AUGUSTA-AIKEN AQCR 53. *Office of Air and Water Programs Contract, 31p., Sept. 18, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Urquhart thermal power plant located in the Augusta-Aiken Air Quality Control Region (Georgia and South Carolina) are presented aas part of an effort to determine the air quality impact of proposed variances to implementation plans in the face of a low- sulfur coal supply deficit. The 24-hour primary air quality standard most likely cannot be met even under implementation plan status at the plant, whereas the annual primary air quality standard does not appear to be jeopardized. The projected average sulfur content of coal for the region is 1.5% under implementation plan regulations and nominal load, maximum load, and maximum concentration conditions. (Author conclusions modified)

55596 **APTIC NO. 75410**

Walden Research Corp., Cambridge, Mass.

MODELING ANALYSIS OF POWER PLANTS FOR COMPLIANCE EXTENSIONS. CENTRAL GEORGIA AQCR 54. *Office of Air and Water Programs Contract, 31p., Sept. 21, 1973. 2 refs.*

Diffusion modeling analyses of sulfur dioxide emissions from the Arkwright and Harlee thermal power plants located in the Central Georgia Air Quality Control Region are presented as part of an effort to determine the air quality impact of proposed variances to implementation plans in the face of a low-sulfur coal supply deficit. Attainment of the 24-hour primary air quality standard most likely can not be achieved in the Arkwright plant region even under implementation plan status, whereas the 24-hour standard does not appear to be jeopardized in the region of the Harlee plant under implementation plan status. Attainment of the annual primary air quality standard can most likely be achieved at both plants under implementation plan regulations. The projected average sulfur content of coal used by power plants in the region is 1.2% under implementation plan regulations, nominal load operations, maximum load operations, and maximum concentration conditions. (Author conclusions modified)

55597 **APTIC NO. 76928**

Saitama Prefectural Government (Japan)

PRESENT SITUATION AND COUNTERMEASURES: AIR POLLUTION. *(Genkyo to taisaku: Taiki osen). Text in Japanese. In: 1973 Environmental White Paper, p. 35-72, Dec. 1973.*

The status of air pollution and countermeasures taken in Saitama Prefecture, Japan, are discussed. The southeastern region of Saitama Prefecture, adjoining Metropolitan Tokyo and Chiba Prefecture, where 71% of the prefectural population and 74% of industrial production are located, is troubled by progressively increasing pollution. Nineteen continuous monitoring stations are located in this region, of which 16 are telemetric. A pollution information exchange system has been formed by the association of Saitama, Chiba, and Kanagawa Prefecture and Metropolitan Tokyo. Dissemination of photochemical smog alert information and filing of pollution damage (health and vegetation) reports have been systematized. In 1972, Saitama Prefecture was second to Metropolitan Tokyo in the number of photochemical smog complaints (5726) registered. Photochemical smog alerts in 1972 occurred from April to October. In 1970, July was the only complaints (1262) were registered. From 1970 to 1972, prefectural automobile registrations had increased from 584,389 to 791,036. Atmospheric sulfur oxides standards were met at 13 monitoring locations in 1972. Nitrogenn dioxide standards were not met. Average yearly values of airborne particulates (over 10 micron in size), based on hourly values, ranged from 0.03-0.13 mg/cu m in 1972. Included in the particulates were heavy metals from managanese, vanadium, nickel, zinc, lead, cadmium and chromium). Amounts of precipitated soot were highest at Kawaguchi City (13-19 tons/sq km/mo), where foundries are located.

1964

55598 **APTIC NO. 79224**

Koehler, Hans-Georg

SAFETY MEASURES CONCERNING THE OCCURRENCE OF ARSENIC HYDRIDE IN INDUSTRIAL PLANTS. *(Sicherheitstechnische Massnahmen beim Auftreten von Arsenwasserstoff in Gewerbebetrieben). Text in German. Arbeitsschutz, no. 8:226-229, 1964. 7 refs.*

Safety measures applicable to working places where arsenic hydride may be released are described in connection with a fatal poisoning in a plant where arsenic hydride was released during the treatment of metallurgical copper cement with sulfuric acid. The poisoning occurred upon start-up after a holiday in cold weather so that arsenic hydride vapors were forced back from the heavy cold air in the chimney and into the working area through the feed opening of the treatment vat. Poisoning symptoms were also observed in workers who were working at a greater distance from the vat. An arsenic hydride concentration of up to 0.52 mg/cu m was measured. To prevent accidents, batches should be analyzed for their arsenic content, and regular air sample analyses should be conducted during the operation. In addition, the reaction should be conducted in a closed system, and the proper operation of the exhaust system should be indicated. The release of arsenic hydride can be expected in all operations in which metals are reacted with raw sulfuric acid or hydrochloric acid.

SOCIAL ASPECTS

1974

55599 **APTIC NO. 79189**

Subcommittee on Environmental Pollution

PUBLIC ATTIDUTE SURVEY ON AUTO AIR POLLUTION IN THE GREATER HOUSTON AREA. *In: Implementation of Transportation Controls. 93rd Congress (Senate), Second Session, Serial 93-H29, p. 98-113, May 1 and 2, 1974. (Hearings before the Committee on Public Works.)*

The results of a survey of public opinion in the Houston area regarding air pollution are presented. More than 93% of the respondents felt that air pollution was a problem in the area. Some 71% of 163 households questioned indicated that they favored a retrofit program costing about $50.00; only 35% supported a retrofit program costing $200.00. An inspection/maintenance program was favored by 82% of the respondents. Reaction to all types of travel restrictive controls was strongly negative. Response to transit related questions generally indicated the area s current low reliance on public transit. About 37% of the respondents indicated an interest in car pooling for work commute trips. An additional 9.5% were currently car-pooling. Staggered work hours were favored by 71% of the respondents as a means of reducing congestion and pollution. Only 7.5% of the respondents were willing to consider disposal of a family car if better public transit service were available.

1973

55600 **APTIC NO. 79190**

Loveridge, Ronald O., Kerry Fine, and Michael Fine

RIVERSIDE COMMUNITY OPINION SURVEY. *In: Implementation of Transportation Controls. 93rd Congress (Senate), First Session, Serial 93-H29, p. 22-80, Nov. 16, 1973. (Hearings before the Subcommittee on Air and Water Pollution of the Committee on Public Works.)*

The results of a community opinion survey of various problems faced by the residents of the City of Riverside, California, including air pollution, are presented. Air pollution is a central feature of the image of Riverside, being cited by 42% of the people in their description of the city. A sizeable majority (59%) mentioned smog as the most serious problem facing the city. More than 70% of the respondents concluded that smog was worse than the year before. Despite concern over air pollution, fewer residents expressed a willingness to take possible control steps. About 31% of the Riverside residents favored gas rationing, while 43% favored increased used of rapid transit. About 35% were in favor of smog control devices.

55601 **APTIC NO. 77110**

Sacco, John F.

URBAN POLITICS AND AIR QUALITY IMPROVEMENT -- A STUDY OF THIRTY-SEVEN AMERICAN CITIES. *Pennsylvania State Univ., University Park, Pa., Environmental Protection Agency Grant T900011, Publ. 340-73, p. 1-111, Dec. 1973. 73 refs.*

Which of several propositions best explains improvement or deterioration in urban air quality was determined. Three major propositions, each including several sub-propositions, were examined. The first proposition states that the social composition of the city s populace is the most important factor in shaping community action. The second proposition argues that the values and structure of the economic and civic elite are most important. The third argues that the structure of government and activity of the governmental officials are most important. Social composition was measured in terms of education, occupation, income, and race. The influence and values of the economic and civic elite were determined by questionnaire. Governmental structure and activity were measured by the presence or absence of certain governmental reforms and by mayors responses to questionnaires. The dependent variable in this study, air quality improvement or deterioration, was measured in each of thirty-seven study cities by the change in level of total suspended particulate matter for the years 1959-1970. The findings point to the economic and civic elites as the most important determinant of air quality change, social composition as the second most important, and the governmental structure and policy as the least important. (Author abstract modified)

1967

55602 **APTIC NO. 79121**

Lycan, D. R. and W. R. D. Sewell

WATER AND AIR POLLUTION AS COMPONENTS OF THE URBAN ENVIRONMENT OF VICTORIA. *Brit. Columbia Geogr. Series, no. 8:13-18, 1967. 2 refs.*

A questionnaire for the evaluation of public opinion and awareness of air and water pollution problems was administered to 120 respondents in Victoria, British Columbia. Generally, persons who tended to cite Victoria s scenery as an attractive feature, also tended to cite pollution as being a local problem. Sophistication gained through travel or residence in other areas generally tended to relate to recognition of a local pollution problem. Although women tended to be more sensitive to the water pollution problems than men, this was not true of their attitudes towards air pollution. Nearly all the respondents were willing to sign petitions if pollution became serious enough, but very few were willing to organize a campaign. Residents in a relatively nonpolluted area of Victoria tended to respond that pollution was a problem in Victoria in a free- response type question, but when asked whether air pollution was a problem in Victoria they responded negatively.

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